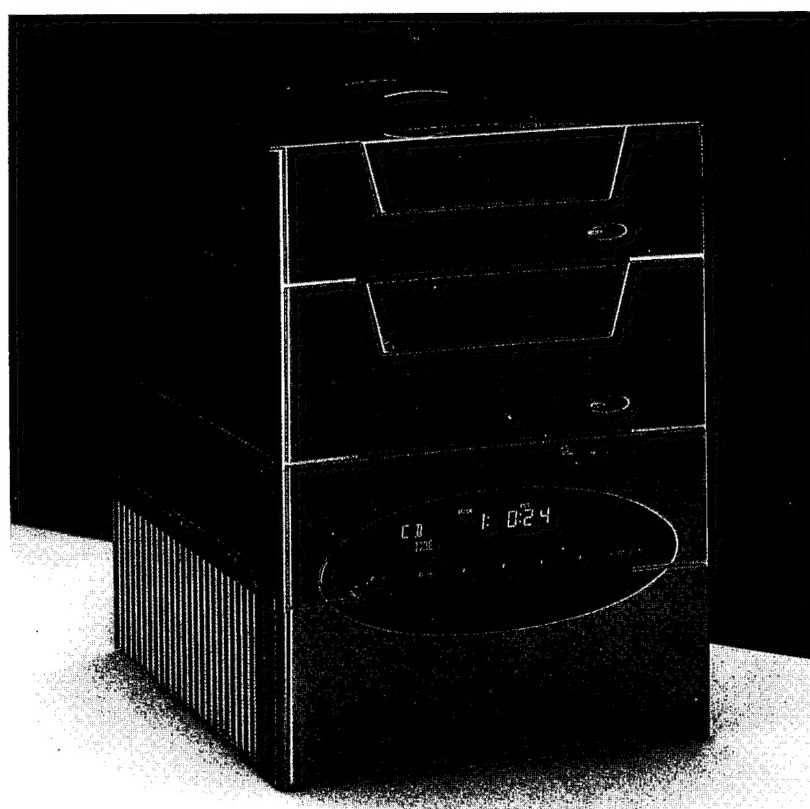


The Harman Kardon FESTIVAL 300 / 500

Intelligent music systems

Technical Manual



harman / kardon

80 CROSSWAYS PARK WEST, WOODBURY, N.Y. 11797
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THE FOLLOWING MARKS FOUND IN THE PARTS LIST OF THIS MANUAL IDENTIFY THE MODEL AS FOLLOWS

USA : NORTH AMERICA AREA MODEL
I,IB,BB : INTERNATIONAL MODEL

SPECIFICATION

Festival 300/500

CDP :

System	Compact Disc Digital Audio
D/A Convert	Dual, linear, Pulse Width Modulated Bit Stream, Clock Rate: 33.8688 MHz
Signal Detection	3-Beam Semiconductor Optical Laser Pickup
Error Correction	CIRC System
Low Level Linearity	± 1.0 dB @ -90 dB
Frequency Response	4 Hz - 20 kHz 0dB/-1.5dB
Total Harmonic Distortion	0.007%
Dynamic Range	97 dB
Signal to Noise Ratio	101 dB
Channel Separation	88 dB
Line Output Level/Impedance	1.6-2.0V @ 10 kohm
Dimension (m/m) (H x W x D)	80 x 270 x 335
(in.)	3 1/8 x 10 5/8 x 13 1/4
Weight (Kg)	3.2
(lb)	7.1
Laser wave length	760~780nm
Laser output power	0.4Watt

Tape Deck :

Type	Horizontal 4-track, 2 channel Auto reverse
Heads	1 hard permalloy Rec/Play Head 1 double gap Erase Head
Tape Speed	4.75 cm/sec 1 7/8 IPS
Frequency Response @ -20dB	20 Hz - 19 kHz ± 3 dB (Metal Tape)
Wow and Flutter NAB, WRMS/DIN	0.05%/0.08%
Signal to Noise Ratio.	
w/CRO2, A-WTD Dolby off	57 dB
Dolby B on	65 dB
Dolby C on	73 dB
Total Harmonic Distortion	1.0%
(1 KHz, metal tape, Dolby level)	
Channel separation	45 dB
Channel Crosstalk	70 dB
Erase ratio	60 dB
Bias Frequency	105 kHz
Output level, Dolby level	365 mV
Input level Dolby level	365 mV
Dimension (m/m) (H x W x D)	100 x 270 x 335
(in.)	4 x 10 5/8 x 13 1/4
Weight (Kg)	3.8
(lb)	8.4

REMOTE CONTROL :

Dimension (mm/in)	19 x 43 x 168 3/4 x 1 5/8 x 6 5/8
Weight (kg/lb.)	0.14/0.31

FM Tuner Section:

Tuning Range	87.5 - 108.0 MHz
Usable Sensitivity Mono	13.2 dBf
50dB Quieting Sens, Stereo	47.2dB I.B.BB
	40dBf USA
Signal to Noise Ratio @ 65 dBf	70dB/65dB I.B.BB
Mono/Stereo	78dB/70dB USA
Capture Ratio	1.5 dB I.B.BB
Selectivity,	
Adjacent/Alternate Channel	10 dB/75 dB
IF rejection	90 dB
Stereo Separation @ 1 kHz 65dBf	50 dB USA
	47 dB I.B.BB
THD @ 1 kHz, 65dBf Mono/Stereo	0.15/0.20%

AM Tuner Section:

	520-1710 kHz	USA
Tuning range	522 - 1611 kHz	I.B.BB
Sensitivity	400 μ V /m	$\leq 700 \mu$ V /m
Selectivity	30 dB	≥ 18 dB
Image rejection	40 dB	≥ 30 dB
IF rejection	65 dB	≥ 55 dB
Dimension (mm/in.)	80 x 270 x 335	3 1/8 10 5/8 13 1/4
Weight (kg /lb)	4.0/8.8	

Amplifier

	A500	A300
Continuous Average Power 4 Ohm	60 Watt	35 Watt
20Hz-20kHz 0.3% THD		
High Instantaneous		
Current Capability	± 35 Amps	± 25 Amps
Negative Feedback	20 dB	20 dB
Power Bandwidth		
@ Half Rated Power (into 4 Ohms)	10Hz-100KHz	10Hz-100KHz
Frequency Response @ 1W+0/-3dB	0.5Hz-180KHz	0.5Hz-180VHz
Slew Rate	140V/ μ sec	100V/ μ sec
Rise Time	1.8 μ sec	1.8 μ sec
Damping Factor	60	60
Signal to Noise Ratio	98 dB	98dB
(below rated, power, A-wtd)		
Tone Control Range (+/-)	10/10 dB	10/10dB
(Bass @ 50Hz/Treble @ 10kHz)		
Bass assist Boost @ 55 Hz	6 dB	6dB
Dimension (m/m) (H x W x D)	100 x 270 x 335	100 x 270 x 335
(in.)	1/4 x 10 5/8 x 13	1/4 x 10 5/8 x 13 1/4
Weight (kg)	6.6	5.5
(lb)	14.5	12.1

Specifications and components are subject to change without notice.
Overall Performance will be maintained or improved.

SAFETY PRECAUTIONS

Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing.

(1) Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.

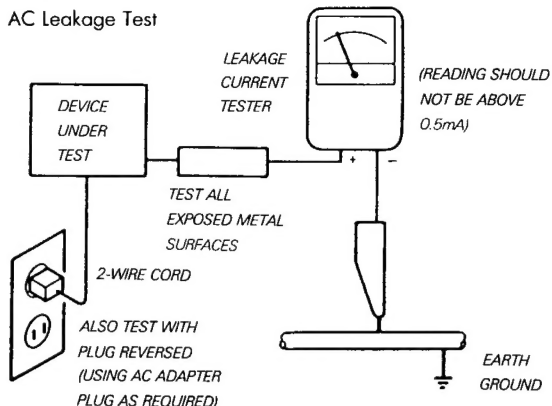
(2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks.

Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, both are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back over.

c. **Leakage Current Hot Check**—With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 "Leakage Current for Appliances" and Underwriters Laboratories (UL) 1270. (34.6). With the instrument AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle bracket, metal cabinet, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the instrument power cord plug in the outlet and repeat test. **ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER.**

AC Leakage Test

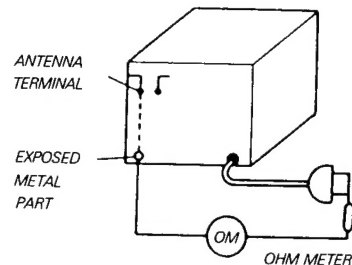


d. Insulation Resistance Test

- (1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug.
- (2) Turn on the power switch of the instrument.
- (3) Measure the resistance with an ohmmeter between the jumpered AC Plug and each **exposed metallic** cabinet part on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. The reading should be as shown below. If it is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer.

e. Insulation Resistance Test Cold Check

- (1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug.
- (2) Turn on the power switch of instrument.
- (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each **exposed metallic** cabinet part on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 Megohm. When there is no return path to the chassis, the reading must be "infinite". If it is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer.



PRODUCT SAFETY NOTICE

Some electrical and mechanical parts have special safety related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. parts that have special safety characteristics are identified by shading, by (Δ) on schematics and parts listed. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire, and/or other hazards. Products Safety is under review continuously and new instructions are issued whenever appropriate.

SERVICING PRECAUTIONS

CAUTION: Before servicing instruments covered by this manual and its supplements, read and follow the SAFETY PRECAUTIONS on this page.

NOTE: If unforeseen circumstances created conflict between the following servicing precautions and any of the safety precautions, **always follow the safety precautions.**

Remember: Safety First.

General Servicing Precautions

- a. Always unplug the instrument AC power cord from the AC power source before:
 - (1) Removing or reinstalling any component, circuit board, module, or any other instrument assembly.
 - (2) Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
 - (3) Connection a test substitute in parallel with an electrolytic capacitor in the instrument.

Caution: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
- b. Do **not** defeat any plug/socket B+ voltage interlocks with which instruments covered by this manual might be equipped.
- c. Do **not** apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
- d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

NOTE: Refer to Safety Precautions on page 3.

- (1) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.

ELECTRO STATICALLY SENSITIVE(ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charge sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

- (2) The Components used in the unit has a specified flammability and dielectric strength. When replacing any components, use components which has the same ratings. Components marked (Δ) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace with the appointed components.
- (3) An insulation tube or tape is sometimes used and some components are raised above the printed wiring board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install them as they were.
- (4) After servicing, always check that the removed screws, components and wiring have been installed correctly and that the portion around the service part have not been damaged and so on. Further check the insulation between the blades of attachment plug and accessible conductive parts.

Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power on. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between the each blade of the attachment plug and accessible conductive Parts (Note 1) should be more than 1M-ohm.

Note 1: Accessible Conductive parts including Metal Panels, Output jacks, etc.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

CLASS 1 LASER PRODUCT

Product complies with DHHS rules CFR subchapter J part 1040.10 at date of manufacture.

DANGER—invisible laser radiation when open and interlock failed or defeated. Avoid direct exposure to the beam.

CAUTION—use of all controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CLASS 1 LASER PRODUCT
LASER KLASSE 1
LUOKAN 1 LASERLAITE
KLASS 1 LASERAPPARAT

Be Careful of the Laser Pickup

Although you cannot see it from the outside, a laser pickup is located under the disc tray and a precision lens is built in it.

Since the laser pickup, including the lens element, is especially sensitive to dust, keep the disc tray closed when not in use.

Also do not put your hand inside the unit.

ADVARSEL:

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling.

VAROITUS!

Laite sisältää laserdodin, joka lähettää näkymättömiä silmille vaarallista lasersäteilyä.

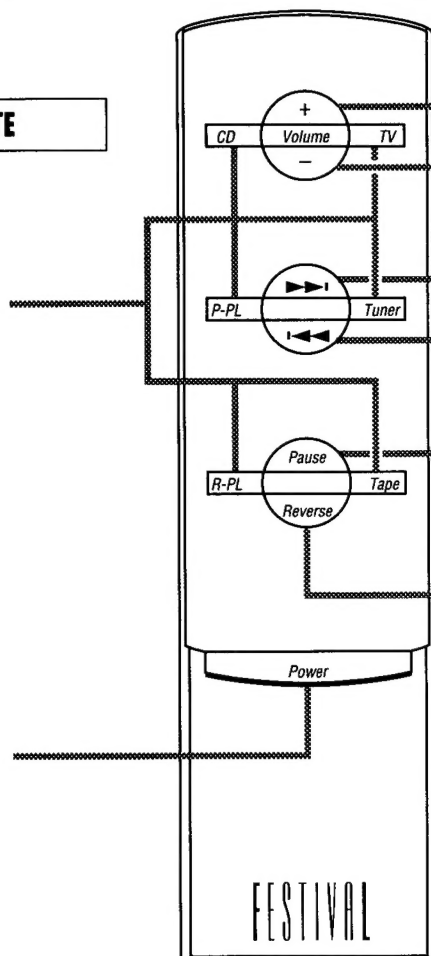
COMPONENTS AND THEIR FUNCTIONS

OPERATING THE REMOTE

Press one of these to change the source of the music:

- CD for disc
- P-PL (program play) for favorite songs from disc
- R-PL (random play) for songs from disc in random order
- TV (optional) for auxiliary components
- TUNER for radio
- TAPE for cassette

Press POWER to turn system on and off.



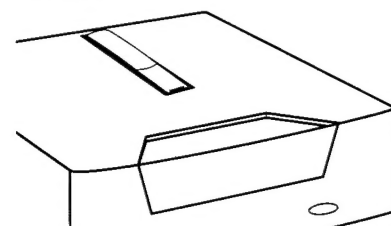
Press VOLUME + and - to adjust sound level up or down.

Press directional buttons ►► and ◄◄ to tune stations or move one track at a time through a disc or tape. (Press and hold ►► and ◄◄ for two seconds to go up or down to the next radio station preset.)

Press PAUSE to mute sound. Press VOLUME + or PAUSE again to resume listening.

Press REVERSE to play the opposite side of a tape.

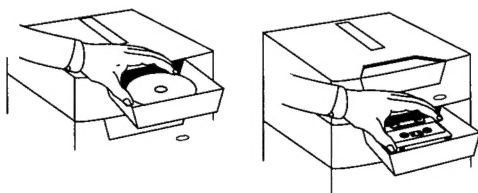
NOTE: When not in use the remote may be placed in the cradle on top of the CD Player.



FRONT PANEL CONTROLS AND ELECTRONIC LABELS

CD and Tape Drawers

The button to the right of the drawer on the CD and tape players can be pushed to open and close the drawer when inserting discs and tapes.



Except for the open/close buttons, all front panel controls are located on the tuner-controller within a large oval window.

All system functions are accessed through pushbuttons located across the middle of this window. Additional set-and-forget controls are located behind a pull-down gate located immediately below the row of pushbuttons.

NOTE: The speaker switch(es) behind door must be pushed in to hear music.

The "EXTERNAL" indicator reminds you to check your external components, if any, anytime the auxiliary input/output jacks are in circuit. If "EXTERNAL" is lighted, but there is no sound, make sure your external device(s) are on.

"RECORD" indicates that a recording is currently in process.

"MUTE" is displayed anytime the PAUSE control is engaged.

Here is the large four letter operating mode display, which shows at a glance which source is playing or if you're in CD favorite track programming mode (CDPR) (CD program).

The main numeric display shows the CD track or radio station you're listening to, or the tape counter time.

The Dolby® noise reduction indicator comes on to show the type of noise reduction being applied to the tape.

The tape direction indicators show the actual direction of tape movement.

Note: The speaker switch(es) behind door must be pushed in to hear music.

The functions of these four buttons are identified by these four ELECTRONIC LABELS directly above them, allowing the functions to change. To activate Electronic Labels, simply press any of these four buttons. Then proceed by pressing the button directly below the feature label you wish to use. If at any time you wish start over, simply wait 10 sec. and start again.

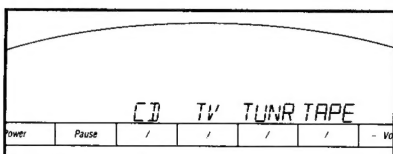
Operating Modes

Festival systems simplify operation by grouping all commands into three basic modes.

We call source selection the "listen mode"—**LSTN** for short. Programming is **PROG.** (program). And recording is **RCRD.** (record). The three of them together comprise your main menu of choices, and all functions are accessed through one or the other of the three operating modes. All functions are operated in essentially the same way, that is, by pressing the unmarked button immediately below the label designating the function on the display.

LISTENING

The LSTN mode lets you select the tuner, the CD player, or the cassette deck, as well as one auxiliary source. When you press LSTN the display reads:

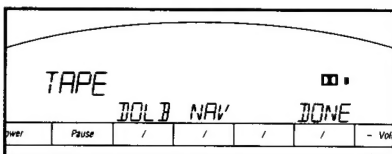


TV refers to an auxiliary source. The other labels refer to the Festival components.

Select a source by pressing the button immediately below the electronic label. Note that when you select any source other than TV you automatically access the functions for that source and that source begins to play.

TAPE LSTN (Listen) Functions

When you select TAPE, the display presents you with two functions:



DOLB stands for Dolby® noise reduction which is selectable through the DOLB button. Press repeatedly to choose Dolby B type noise reduction, Dolby C, or no noise reduction. When Dolby noise reduction is engaged **DD** will be shown in the display along with the letter designation B or C.

The Main Menu

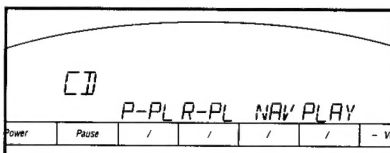
Everything starts with the main menu, and you can get to the main menu one of two ways.

Press **POWER** on the far left of the row of buttons to turn Festival on. The display will light up, and the system will activate the source in use when the system was turned off. (When turned on for the first time, Festival will choose TUNR for the radio.)

If the power is already on, press any one of the four unmarked buttons in the middle of the row.

CD LSTN Functions

When you select CD, the CD begins to play and the following choices appear on the display:

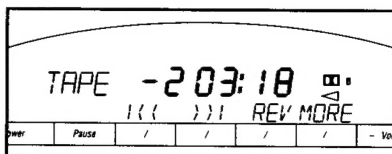


Note that if the CD player is empty, the drawer will slide out, prompting you to load a disc and push the drawer closed.

P-PL (program play) indicates programmed play. In order to exercise this function, you must first program your favorite selections for the current disc. Refer to the section on programming for programming directions.

R-PL (random play) indicates random play. Press R-PL and the CD player will automatically select a random order for playing back the tracks on the CD in the loading tray.

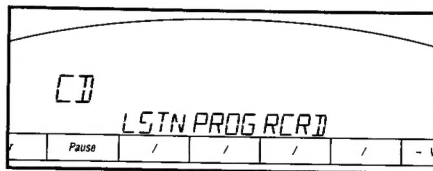
Press NAV (navigate) and the directional indicators **{ { {** and **}} }** will appear on the display.



{ { { will automatically rewind the tape back to a previous song and **}} }** will advance it to a subsequent song. The number of songs to be skipped forward or back are indicated to the left of the tape counter in the display.

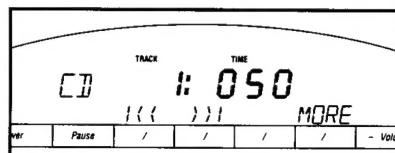
REV — As on the remote, pressing REV reverses the tape. It can also be used to cancel fast forward or rewind. (See below.)

In either case, the main menu will appear on the display.

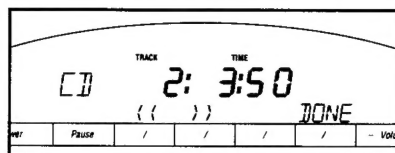


PLAY—Press PLAY to switch from P-PL or R-PL to normal CD play, beginning with the current track.

NAV (navigate)—Press NAV and you can move from track to track using the buttons under the **{ { {** and **}} }** labels appearing on the display.

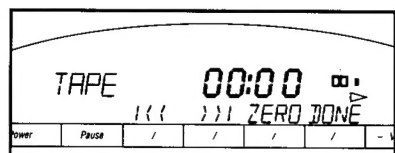


MORE — Press MORE and you can search up or down through the disc to any passage using the buttons beneath the **{ { {** and **}} }** labels.



DONE always returns you to the main menu.

Pressing MORE displays:



Rewind and Fast Forward — Press **{ { {** to rewind to the beginning of the current side and **}} }** to fast forward to the beginning of the next side.

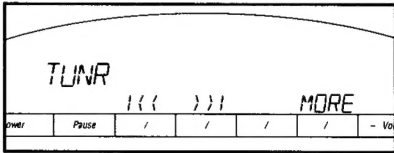
ZERO — Press ZERO to reset the tape counter.

Important Note: The controls on this page will function when the tape is paused by the PAUSE button. This feature can be used to set up for a manual recording. (See Appendix D).

LISTENING

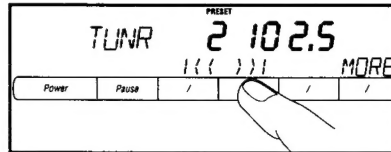
TUNR LSTN Functions

To play the tuner, first select LSTN and then select TUNR from the LSTN choices. The display will now read:



Pressing either directional key will put you into the SEEK mode, and the tuner will proceed to the first strong station.

Press and hold either directional key for two seconds to call up or change the PRESET number (1 to 19) in the display. Continue to hold the directional key to cycle through your presets.



AM and FM Tuning

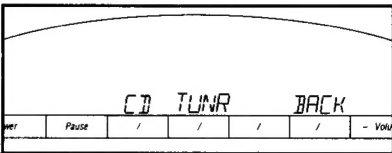
Press MORE to activate the manual tuning function. Use the directional keys to tune up and down the bands. Note that the Festival systems do not have a manual AM/FM switch. To get from one band to another hold either directional key and run through the band you're currently occupying. You'll automatically pass into the other band. (Note that if you use FM only, push the switch on the tuner back panel to bypass the AM band when tuning.) Save your favorite stations in the presets in the PROGRAMMING MODE,

PROGRAMMING

Programming the CD player

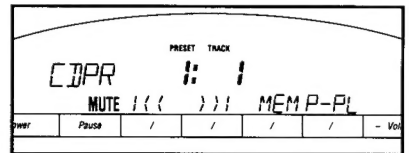
Load the CD in the compact disc player. Enter the main menu. Select PROG (program).

The display will prompt you to choose a source to program. Note that BACK always returns you to the previous display screen.



The Festival compact disc player and tuner are programmable. Programming the tuner consists of saving station presets, while CD programming lets you choose your favorite tracks from a given CD for playback by the P-PL command.

Press CD to program the CD player. The display now reads:



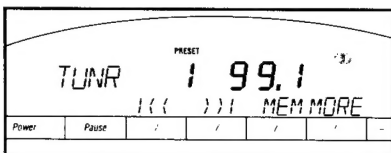
Use the directional keys to select the tracks you wish to program, and with each track selection press MEM to enter the selection into memory. Then to begin programmed play press P-PL. The CD player will then play only those tracks programmed into memory.

NOTE: The program for a given CD is erased when you open the tray.

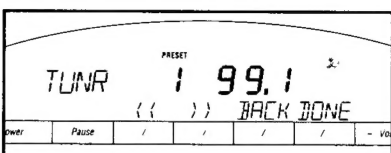
PROGRAMMING

Programming Tuner Presets

To program Tuner presets first enter the main menu by selecting any of the unmarked buttons. Next press PROG and then select TUNR. The display will read:

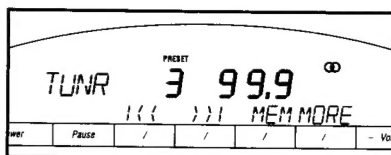


Pressing MORE will change the display to:



Use MORE and BACK to change between these two screens while in the tuner presetting mode.

Using >>> and <<< to SEEK or << and >> to tune manually (See TUNR LSTN functions, above.), tune to a station you wish to memorize. Then, by pressing >>> or <<< for more than two seconds at a time, adjust the displayed preset number to the desired preset between 1 and 19.



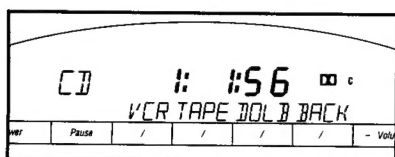
Press MEM (memory) to save that station in that preset number. The preset will automatically be increased by 1 when you press MEM, so you needn't adjust the number manually when memorizing many stations at once.

NOTE: After a period of 10 seconds, Festival will revert to the main menu.

RECORDING

The Festival system gives you considerable flexibility in making recordings. You can record within the system from the tuner or CD player onto the cassette deck. You can also record from a system source to an outboard recorder. You can also record from an outside source onto the system cassette deck. However, when outboard components are involved the process is less automatic.

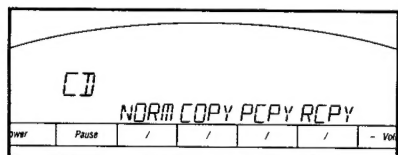
Before making a recording, you must first select the source you wish to record by entering the LSTN (listen) mode from the main menu, and, of course, you must load a blank cassette in the tape well. Then go back to the main menu and press RCRD (record). The display will read:



RECORDING

Recording to the internal cassette

Press TAPE and the display presents you with four recording choices:



When you select NORM (normal) the cassette deck will begin recording the source immediately.

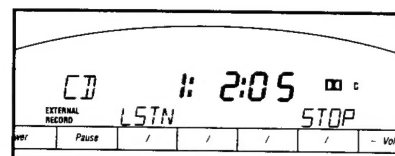
Select COPY to automatically duplicate a CD onto tape. The tape is wound back to the beginning, and the recording starts at the beginning of track one.

THE COPYING PROCESS CAN ONLY BE INTERRUPTED BY PRESSING THE BUTTON BELOW **STOP** ON THE DISPLAY OR SHUTTING OFF THE POWER.

Note that TAPE and DOLB will not be lit if you are listening to TAPE. This prevents inadvertently recording over a favorite tape.

Recording to an external recorder

VCR should be selected when recording to an external recorder you've connected to your system. If you're using the system cassette deck to record, you can disregard this section. When you press VCR, EXTERNAL and RECORD will appear in the display to remind you to set up your external component for recording. Also, the STOP command is added to the main menu, so you can stop recording. Finally, PROGRAMMING and RECORDING commands are omitted from the main menu



while recording is in progress. IF YOU HEAR NO SOUND AFTER PRESSING VCR, CHECK THE CONNECTIONS AND SETTINGS OF THE EXTERNAL RECORDER.

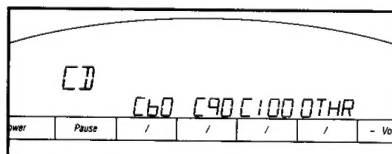
Dolby noise reduction is selectable through the DOLB button. Press DOLB once to choose Dolby B type noise reduction, again for Dolby C, and again for no noise reduction. When noise reduction is engaged the **DD** will be shown on the display along with the letter designation B or C.

BACK takes you back to the main menu.

PCPY (programmed copy) stands for Programmed Copy. It is like COPY, but only the pre-programmed selections are copied. The CD player must have been previously programmed for the current disc.

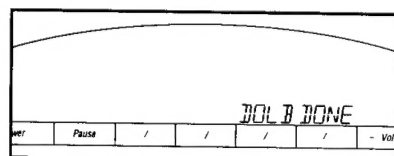
RCPY (random copy) stands for random copy, and it is the same as COPY, except the disc is copied to tape with the songs in random order.

Choosing COPY, PCPY, or RCPY automatically places you in the optional EDIT mode where you are given the following choices:



C60, C90, and C100 refer to 60, 90, and 100 minute tapes respectively.

Festival uses this information during the copying process to record the songs to avoid running out of tape in mid track. If desired, press the button corresponding to the tape you're using, to activate the EDIT feature for this recording. After you have selected a tape length, the display reads:



Pressing DOLB repeatedly cycles you through the choices of Dolby B noise reduction, Dolby C noise reduction, or Dolby noise reduction off. DONE completes the command sequence.

OTHER FRONT PANEL CONTROLS

A hinged door directly below the row of seven pushbuttons conceals secondary controls. Press the top of the gate to lower it and expose the controls.

The SPEAKER button(s) (A and B on the Festival 500) let you turn each pair of speakers off, to listen through headphones or to one speaker pair at a time.

BALANCE adjusts the relative levels of the left and right channels.

TREBLE and BASS are tone controls.

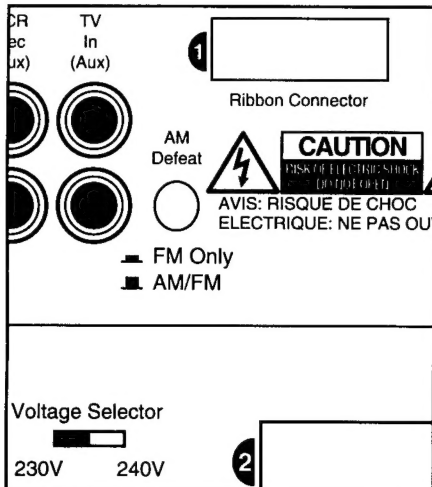
BASS ASSIST should only be used with Festival speakers. It extends low bass response when the button is in.

PHONES is a jack for lightweight stereo headphones. (Use the SPEAKERS button(s) to turn the main speakers off.)

REAR PANEL CONTROLS

AM DEFEAT

This control is located on the tuner back panel. When this button is pressed in, only FM stations may be tuned, although AM presets that were previously memorized may still be called up in the usual way.



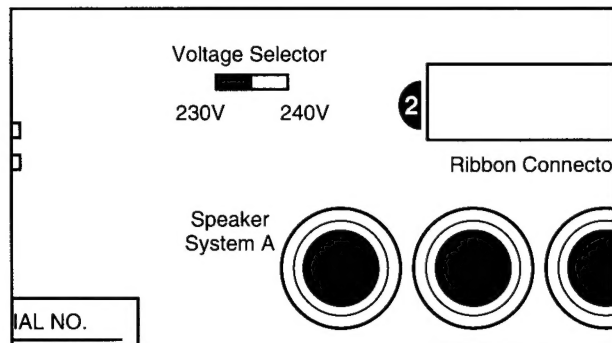
APPENDIX A

CONNECTING ADDITIONAL COMPONENTS TO YOUR FESTIVAL SYSTEM

The TV (Aux) input at the extreme right of the row of phono jacks on the tuner-controller will accept almost any stereo output except for that of a turntable. You can, for instance, connect the audio outputs of a stereo television, a stereo VCR, a laserdisc player, DCC, Mini-Disc, or a satellite receiver. The VCR Rec (Aux) output, which is next to the TV (Aux) input, lets you record from any of the sources comprising the Festival system onto another cassette deck, a hi-fi VCR deck, a Mini-Disc player, or a DCC deck. Keep in mind, however, that if you utilize the VCR Rec (Aux) output, you must initiate the recording from the outboard component. The Festival's system commands cannot control the recording process for any recording device aside from its own cassette deck.

AC VOLTAGE SELECTOR

Export models of the Festival systems have switches permitting the selection of either 230V or 240V AC voltages. This control is located on the integrated amplifier back panel.



CD OUTPUT LEVEL CONTROL

The CD output level is preset at the factory for optimum recording and listening performance. Some advanced users may want to customize this setting. This level control on the CD back panel has three settings: 0 dB—the standard setting, + 1.5 dB, and + 3 dB.

ELECTRICAL PARTS LIST REFERENCE

NOTE : Assignment of common parts codes.

RESISTOR

1118 □ □ □ 2 □ Carbon film resistor, ± 5%, 1/8W
 1114 □ □ □ 2 □ Carbon film resistor, ± 5%, 1/4W
 (2) lead type
 (1) resistor value

Examples

(1) Resistor Value
 0.47 ohm...478 4.7 ohm...479 68 ohm...680
 470 ohm ...471 2.7 Kohm...272 56 Kohm...563
 (2) Lead type
 PS type ...1 TP type ...5

CERAMIC CAPACITOR

1886 □ □ □ □ 5 Ceramic capacitor
 disc type
 Temp. coeff. P350-N1000, 50V
 (2) tolerance (capacity deviation)
 (1) capacity value

Examples

(1) Capacity Value
 4pF ...040 47pF ...470 220pF ...221
 (2) Tolerance
 ±0.25pF0 ±0.5pF1 ±1pF.....2
 ±2pF3 ±5pF4 ±10pF.....5
 ±20%6 +50%-20%...7 +40%-20%...8
 +80%-20%.....9

MYLAR CAPACITOR

1506 □ □ □ 41 Mylar capacitor, ±5%, 50V
 (1) capacity value

Examples

(1) Capacity Value
 0.00047uF.....471 0.0056uF.....562 0.047uF.....473
 0.68uF684

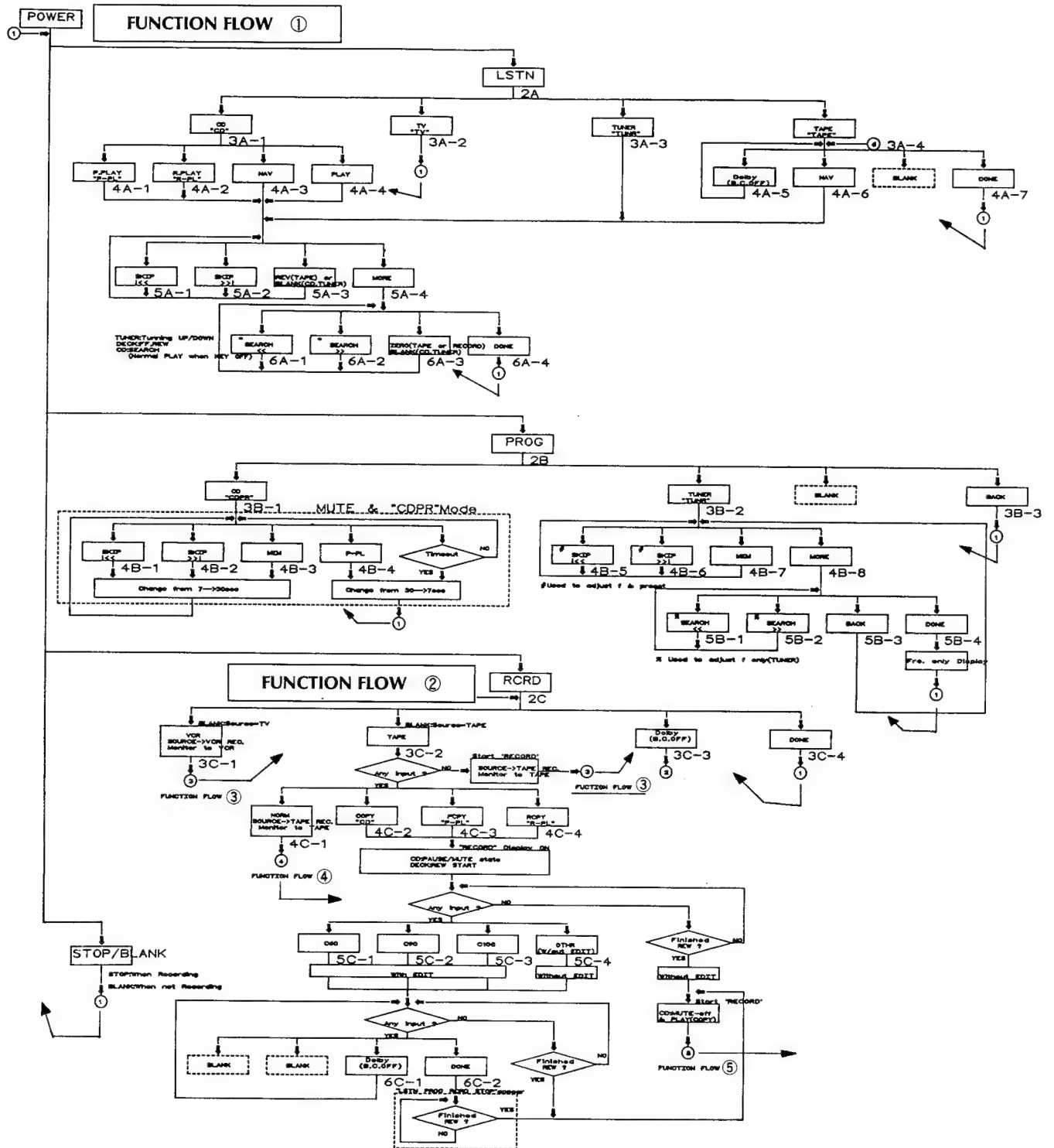
ELECTROLYTIC CAPACITOR

142 □ □ □ □ 6 □ Electrolytic capacitor, ±5%, 50V
 (3) lead type
 (2) capacity voltage
 (1) working voltage

Examples

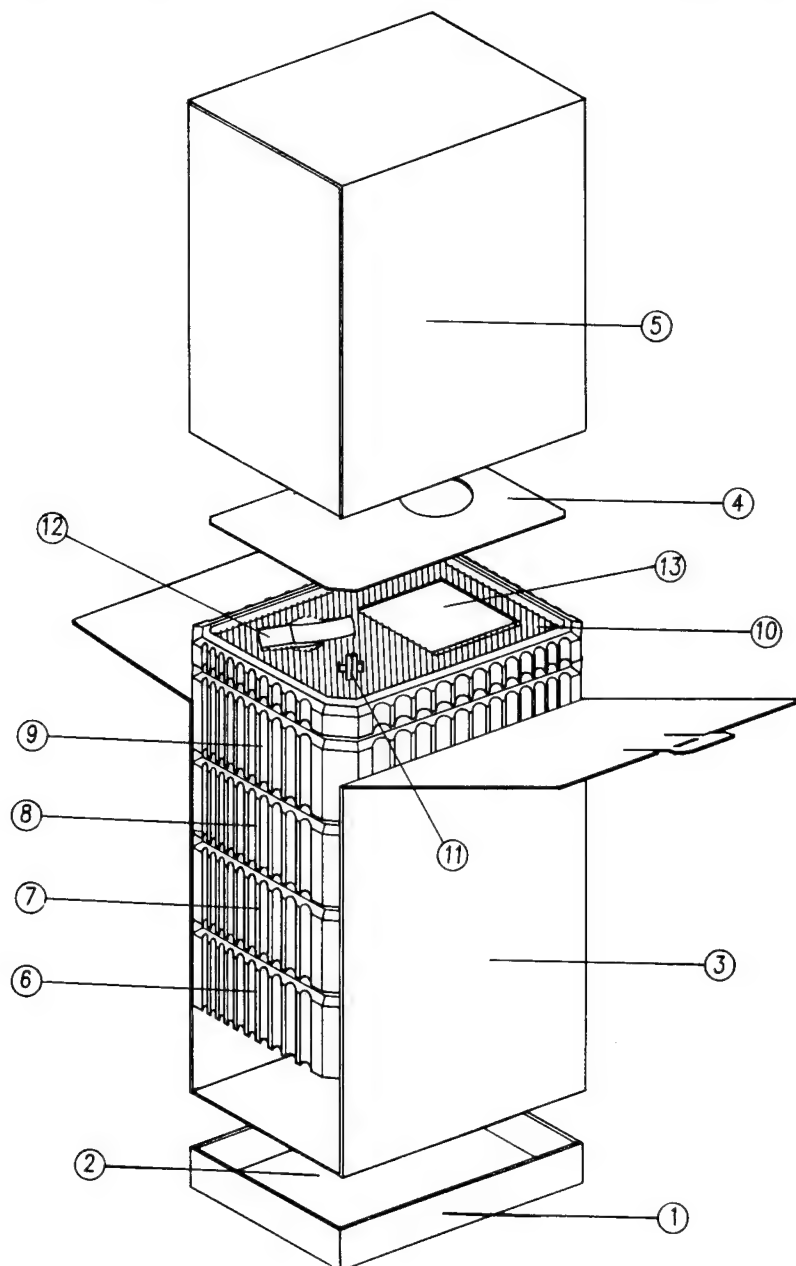
(1) Working Voltage
 6.3V.....1 10V.....2 15V.....3
 25V.....4 35V.....5 50V.....6
 (2) Capacity Value
 0.47uF.....478 4.7uF.....479 33uF.....330
 470uF.....471 2200uF.....222
 (1) Lead type
 A-type.....1 A-type TP.....2

SYSTEM FLOW CHART



SYSTEM PACKING DRAWING

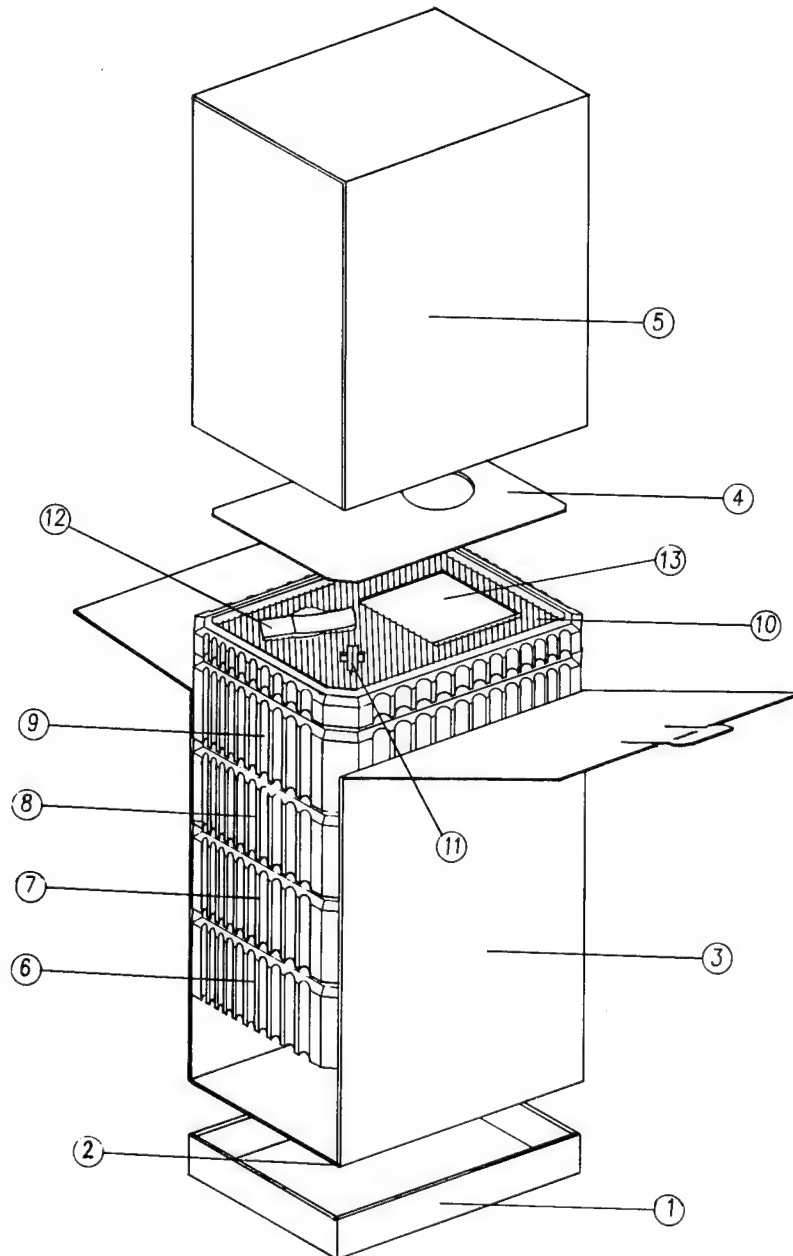
Festival : 300



NO	PARTS NAME	PARTS NO.	Q'TY	REMARK
1	PACKING BASE	3-324-030-01	1	USA,I,IB,BB
2	BASE LID	3-324-031-01	1	USA,I,IB,BB
3	SLEEVE INNER	3-821-103-12	1	USA,I,IB,BB
4	INNER LID	3-324-019-12	1	USA,I,IB,BB
5	CARTON OUT	3-127-815-11	1	I,IB,BB
6	CARTON OUT	3-128-607-11	1	USA
7	CDP ASS'Y	HK-CD300	1	USA,I,IB,BB
8	DECK ASS'Y	HK-C300	1	USA,I,IB,BB
9	TUNER ASS'Y	HK-T300	1	USA,I,IB,BB
10	AMP ASS'Y	HK-A300	1	USA,I,IB,BB
11	PAD UPPER	3-324-018-02	1	USA,I,IB,BB
12	BATTERY ASS'Y	2-154-204-01	1	USA,I,IB,BB
13	REMOCON ASS'Y	A-221-8A0-02	1	USA,I,IB,BB
14	MANUAL	3-128-604-01	1	USA,I,IB,BB

SYSTEM PACKING DRAWING

Festival :500



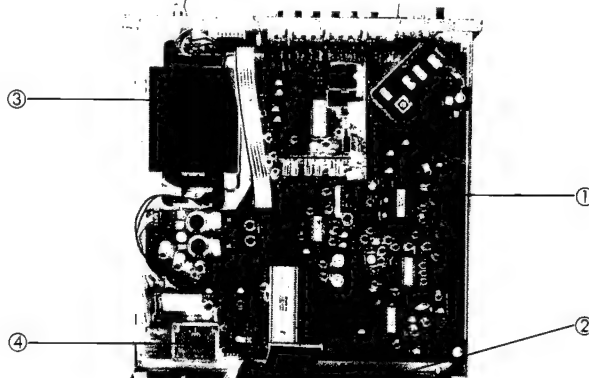
NO	PARTS NAME	PARTS NO.	Q'TY	REMARK
1	PACKING BASE	3-324-030-01	1	USA,I,IB,BB
2	BASE LID	3-324-031-01	1	USA,I,IB,BB
3	SLEEVE INNER	3-821-103-12	1	USA,I,IB,BB
4	INNER LID	3-324-019-12	1	USA,I,IB,BB
5	CARTON OUT	3-127-925-11	1	I,IB,BB
6	CDP ASS'Y	HK-CD500	1	USA,I,IB,BB
7	DECK ASS'Y	HK-C500	1	USA,I,IB,BB
8	TUNER ASS'Y	HK-T300	1	USA,I,IB,BB
9	AMP ASS'Y	HK-A500	1	USA,I,IB,BB
10	PAD UPPER	3-324-018-02	1	USA,I,IB,BB
11	BATTERY ASS'Y	2-154-204-01	1	USA,I,IB,BB
12	REMOCON ASS'Y	A-221-8A0-02	1	USA,I,IB,BB
13	MANUAL	3-128-604-01	1	USA,I,IB,BB

TUNER SECTION

1 TUNER

INTERNAL VIEW

TOP VIEW



- ① PCB-1 Main p.c.board
- ② PCB-2 Control p.c.board
- ③ Power trans(main)
- ④ Power trans(sub)

DISASSEMBLY PROCEDURES

1 TOP Cover Removal

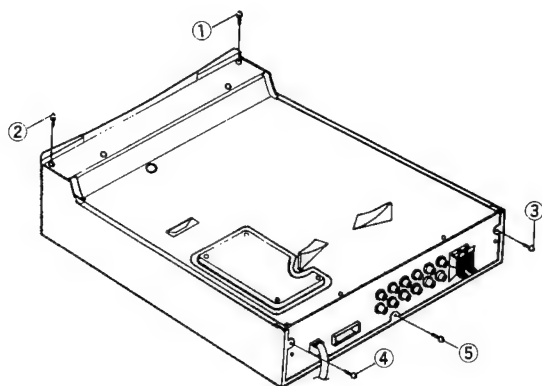


Fig. 1

1. Remove screws ① to ⑤ in Fig. 1
2. Remove the top cover.

2 Rear Panel Removal

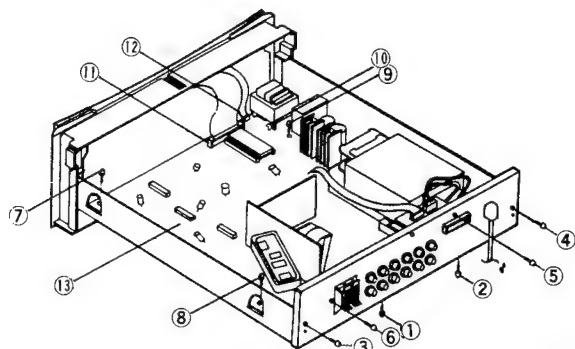


Fig. 2

1. Remove screws ① to ⑥ in Fig. 2, and then remove the rear panel.

3 PCB-13 (Main PCB) Removal.

1. Remove the rear panel in Fig. 2(Refer to step ②)
2. Remove connectors ⑪ to ⑬ in Fig. 2, and then remove pcb supports ⑩
3. Remove screws ⑦ to ⑨ in Fig. 2, and then remove the main pcb ⑬

4 Front Panel Assembly Removal

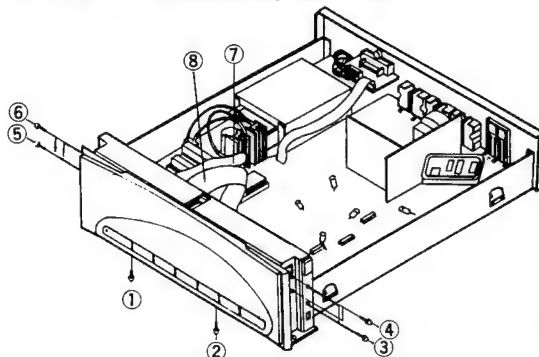


Fig. 3

1. Remove connectors ⑦ to ⑧ in Fig. 3
2. Remove screws ① to ⑥, and then remove the front panel assembly from the unit in Fig. 3

5 PCB-6 (Control PCB) Removal.

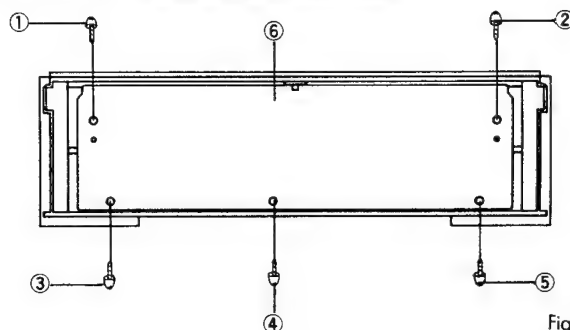


Fig. 4

1. Remove the front panel assembly in Fig. 3. (Refer to step ④)
2. Remove screws ① to ⑤ in Fig. 4, and then remove the control pcb ⑥

ALIGNMENT PROCEDURES

Tuner

Condition: Set the volume control maximum

*: Only USA version

FM Section

- Set the FM mode by pressing the directional keys to tune up and down the bands.
- Connect the FM signal generator (FM SG) to the FM antenna 75 (* 300) ohm terminal through the 75 (* 300) ohm dummy Antenna.
- Set the Tuner to the FM band

1) Tune the FM SG to the Tuner.

2) connect the FM multiplex stereo signal generator to the FM SG external Modulation terminal

3)

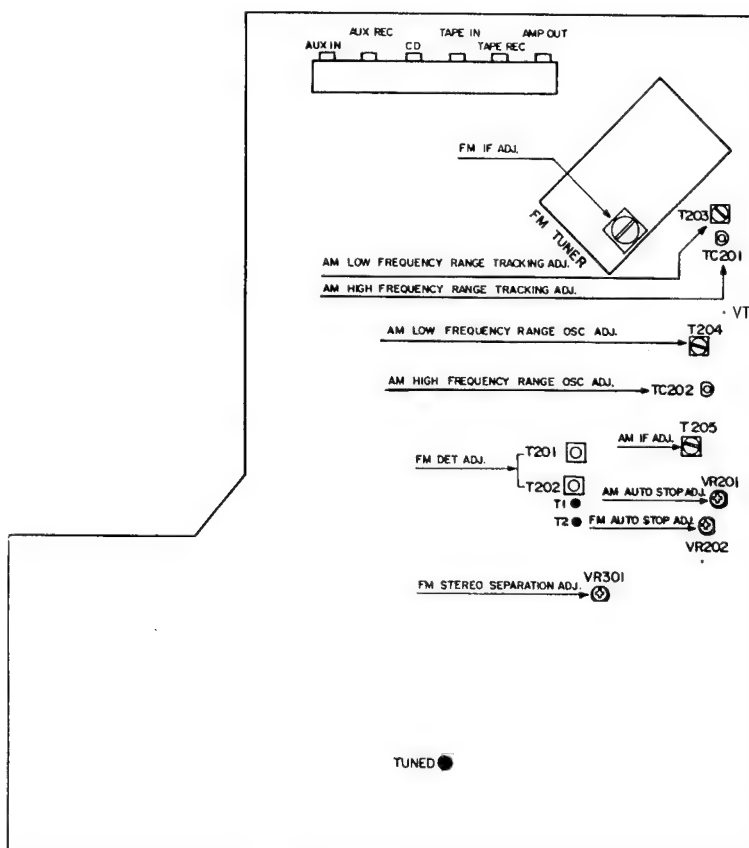
FM signal generator	1 kHz, 40 kHz deviation *1 kHz, 75 kHz deviation
Stereo modulator	L + R = 22.5(%), L-R = 22.5(%), 19 kHz = 8(%) * L + R = 45.5(%), L-R = 45.5(%), 19 kHz 9(%)

Step	FM SG(*3)		Tuner Frequency Display	Adjustment Location	Adjustment procedure
	Frequency	Level			
1	No signal		87.5 MHz		Confirm that 1.9V DC $\pm 0.5V$ between terminal V_T and Ground.
2	No signal		108.0MHz		Confirm that 8.0V DC $\pm 0.5V$ between terminal V_T and Ground.
3	98.0 MHz	72 dBf		T 201 T 202	Adjust until the DC voltage is 0V $\pm 5mV$ at between TP_1 and TP_2 Adjust until distortion at output L or R terminal is minimum.
4					Repeat steps 3 for optimum the DC voltage and minimum THD
5	98 MHz set to stereo	72 dBf	98.0 MHz	I.F (within $\pm 90^\circ$)	Adjust until Distortion at output L or R terminal is minimum.
6	98 MHz	38 dBf ± 3 dBf *32 dBf ± 3 dBf	98.0 MHz	VR 202	Adjust VR202 TEST POINT TUNED become 0V at 38 dBf (*32dBf)
7	98 MHz set to stereo	72 dBf	98.0 MHz	VR 301	Adjust until stereo separation at output L or R terminal is maximum.

AM Section

- Connect the furnished AM loop antenna between terminals AM ANTENNA and GND.
- Connect the AM signal generator(AM SG) to the AM Antenna terminal

Step	AM SG 1 kHz 30% modulation		Tuner Frequency Display	Adjustment Point	Adjustment procedure
	Frequency	Level			
1	No signal		522 kHz *(520 kHz)	T 204	1.0 V DC between terminal V_T and GND.
2	No signal		1611 kHz *(1710 kHz)	TC 202	8.0V DC between terminal V_T and GND.
3	Repeat steps 1 and 2 for optimum voltage				
4	603 kHz *(600 kHz)	60 dB μ	603 kHz *(600 kHz)	T 203	Adjust until maximum Sensitivity is obtained
5	1395 kHz *(1400 kHz)	60 dB μ	1395 kHz *(1400 kHz)	TC 201	
6	999 kHz *(1000 kHz)	60 dB μ	999 kHz *(1000 kHz)	T 205	
7	999 kHz *(1000 kHz)	50 dB μ ± 7 dB	999 kHz *(1000 kHz)	VR 201	Adjust VR201 until TEST POINT "TUNED" becomes OV at 50dB μ



Tuner : Adjustment point

TUNER BLOCK DIAGRAM



Tuner

■ FM TUNER SECTION

The FM signal which has entered through the antenna is high-frequency amplified in the front end. Then it is mixed with the output of the local oscillators and converted into the 10.7 MHz intermediate-frequency.

The 10.7 MHz signal is amplified in the intermediate-frequency amplifying section which consist of F101, Q101, Q102, F102, Q103 and F103 and fed to pin 1 of IC201. In IC201, the signal is sent through the IF amplifier and after being detected in the quadrature, it is sent through the post amplifier to pin 12 and then input to pin 2 of IC301. In IC301, the pilot signal is detected and the 38 KHz signal is produced. Then by this signal, stereo signal is demodulated, output from pin 6 for the left channel and from pin 8 for the right channel and transmitted to the input selector section.

■ AM TUNER SECTION

The AM signal which has entered through the antenna passes through the tuning circuit consisting of T203 and is inputted to pin 21 of IC201. In IC201, it undergoes radio-frequency amplification and local oscillation and is output from pin 20, and passed through the transformer (T205) and ceramic filter (F201) and enters pin 18 of IC201. It is then passed through the IF amplification and detection and is output from pin 15. This signal is fed to IC301.

■ SYNTHESIZER SECTION

* FM

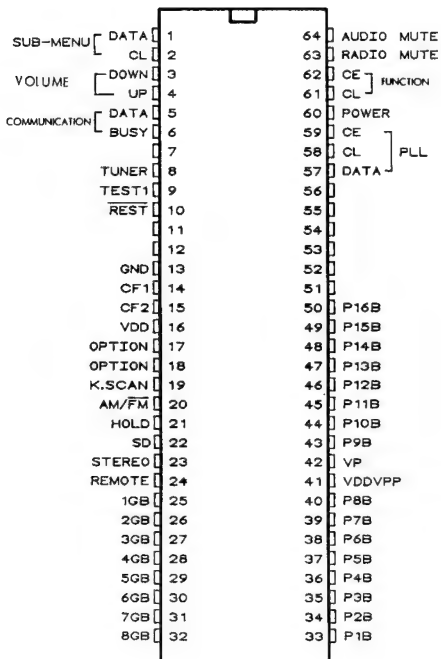
The local oscillator output from the front end is fed to pin11 of the prescaler IC401 and after being frequency divided into 34 or 32, control output is fed from IC701, compared with the divided local oscillator frequency and output to pin 14. This voltage is level converted by Q401 and Q402, and fed to the front end.

* AM

The local oscillation output is fed from pin 24 of IC201 to pin 10 of IC401. In IC401, control output signal is fed from IC701, compared with the local oscillator frequency and output to pin 14. This voltage is level converted by Q401 and Q402, and fed to the AM local oscillator section.

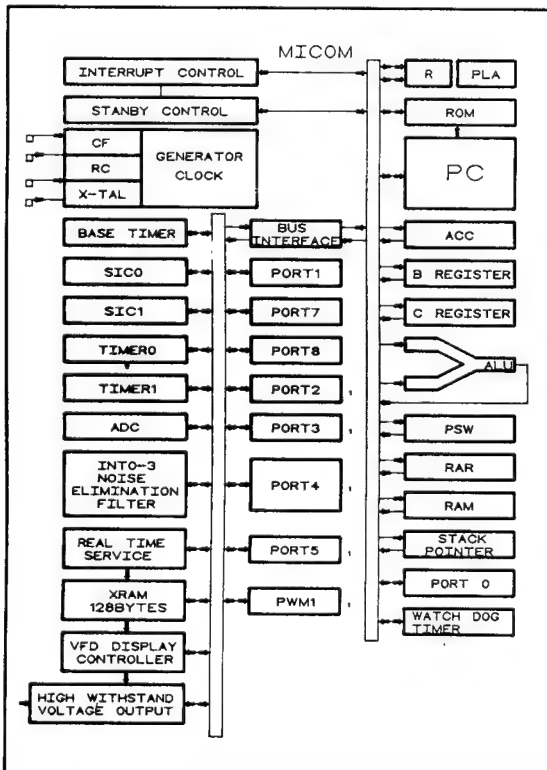
IC FUNCTION BLOCK DIAGRAM

IC701 : MICRO-COMPUTER



MICOM IC TERMINAL FUNCTION TABLE

LE 1044	TERMINAL NAME	No.	INPUT/OUTPUT	Function Description
	DATA	1	OUTPUT	FLT SUB-MENU
	CL	2	OUTPUT	
	DOWN	3	OUTPUT	VOLUME
	UP	4	OUTPUT	
	DATA	5	INPUT	REMOCON
	BUSY	6	OUTPUT	
	TUNER	7	OUTPUT	
	TEST1	8	OUTPUT	FOR TUNER FUNCTION
	REST	10	INPUT	Test Terminal(Use with open)
		11	INPUT	Reset Terminal
		12	OUTPUT	
	GND	13	—	GND
	CF1	14	OUTPUT	CONNECT QUARTZ OSCILLATOR
	CF2	15	OUTPUT	CONNECT QUARTZ OSCILLATOR
	VDD	16	—	Power supply + terminal
	OPTION	17	INPUT	
	OPTION	18	INPUT	
	K.SCAN	19	INPUT	8bit Input port
	AM/FM	20	INPUT	
	HOLD	21	INPUT	
	SD	22	INPUT	
	STEREO	23	INPUT	8 bit Input port
	REMOTE	24	INPUT	
	1GB	25	OUTPUT	
	2GB	26	OUTPUT	
	3GB	27	OUTPUT	
	4GB	28	OUTPUT	
	5GB	29	OUTPUT	
	6GB	30	OUTPUT	
	7GB	31	OUTPUT	
	8GB	32	OUTPUT	
	P16B	33	OUTPUT	
	P15B	34	OUTPUT	
	P14B	35	OUTPUT	
	P13B	36	OUTPUT	
	P12B	37	OUTPUT	
	P11B	38	OUTPUT	
	P10B	39	OUTPUT	
	P9B	40	OUTPUT	
	VP	41	—	Power Supply
	VDDVPP	42	—	Power Supply - (Negative)
	P8B	43	OUTPUT	
	P7B	44	OUTPUT	
	P6B	45	OUTPUT	
	P5B	46	OUTPUT	
	P4B	47	OUTPUT	
	P3B	48	OUTPUT	
	P2B	49	OUTPUT	
	P1B	50	OUTPUT	
		51	—	
		52	—	
		53	—	
		54	—	
		55	—	
		56	—	
	DATA	57	OUTPUT	PLL Data
	CL	58	OUTPUT	
	CE	59	OUTPUT	
	POWER	60	OUTPUT	Power on/off for remcon
	CL	61	OUTPUT	Function Selector
	CE	62	OUTPUT	MUTE FOR RADIO
	RADIO MUTE	63	OUTPUT	MUTE FOR AUDIO
	AUDIO MUTE	64	OUTPUT	



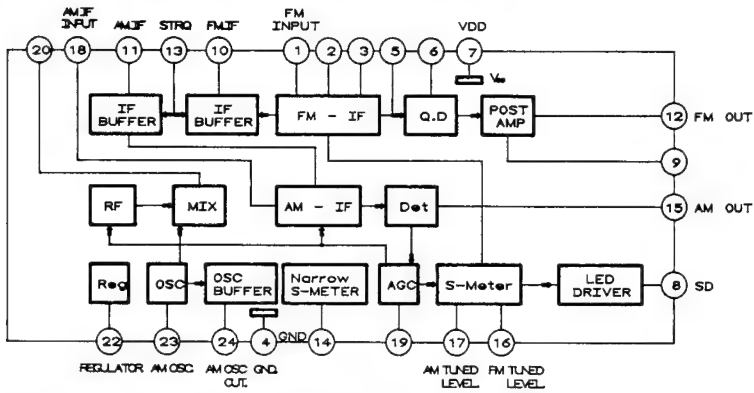
IC 701 OPTION SELECTION

OPTION1 (PIN NO.18)	OPTION2 (PIN NO.17)	BAND RANGE
H	H	FM 76.0MHz - 90.0 MHz :100KHz STEP AM 522 KHz - 1629 KHz :2KHz STEP
H	L	FM 87.5MHz - 107.9 MHz :200KHz STEP AM 520 KHz - 1710 KHz :10KHz STEP
L	H	FM 87.5MHz - 108.0 MHz :100KHz STEP AM 520 KHz - 1710 KHz :10KHz STEP
L	L	FM 87.50MHz - 108.00MHz :50KHz STEP AM 522 KHz - 1629 KHz :2KHz STEP

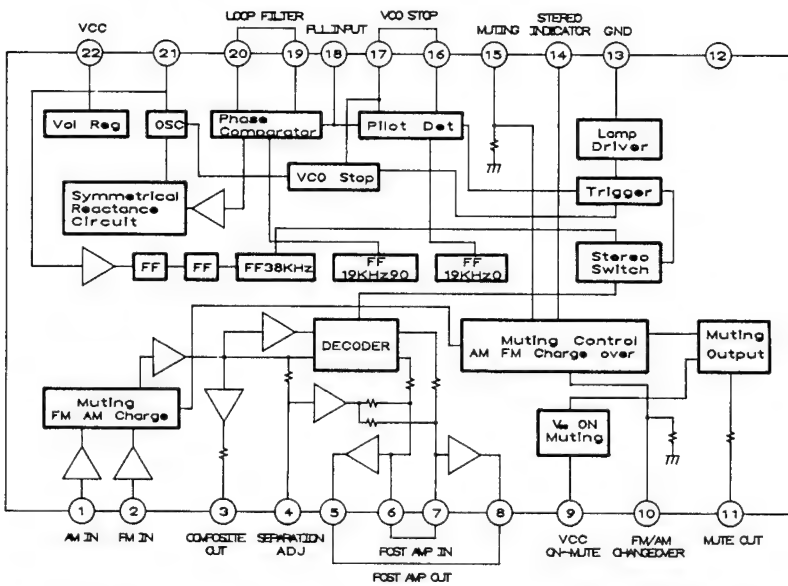
IC 502 FUNCTION SELECTION CHART

MODE SELECTION	OPERATION PIN	IC502 LC7822								IC501 GD4066B
		L1	L2	L3	L4	L5	L6	L7	L8	
LESTEN MODE	TUNER				ON					ON
	CD	ON			ON					OFF
	TAPE					ON				OFF
RECORD MODE	AUX						ON			OFF
	TUNER → TAPE					ON	ON			ON
	CD → TAPE	ON				ON				OFF
	AUX → TAPE				ON	ON	ON			OFF
	TUNER → AUX						ON	ON		ON
	CD → AUX	ON					ON	ON		OFF
	AUX → AUX							ON	ON	OFF

IC201 : LA1266 FM/AM DETECTOR

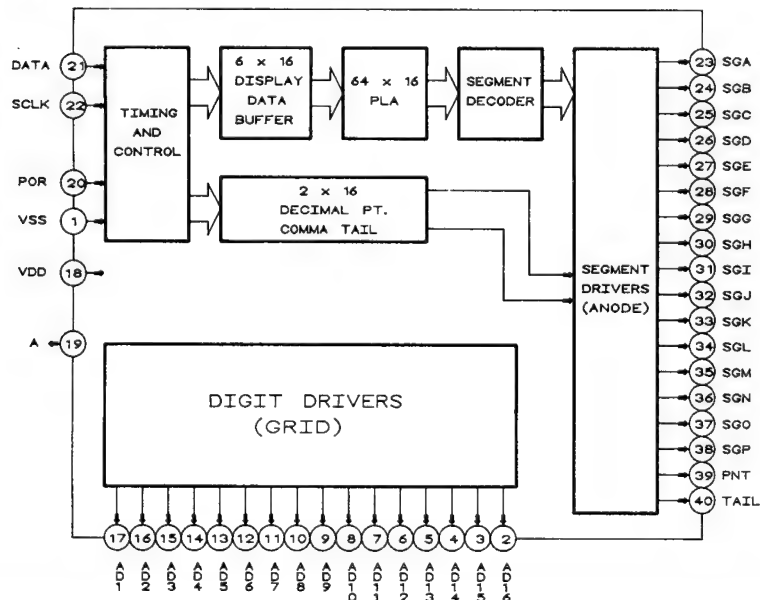


IC301 : MULTIPLEX LA-3401

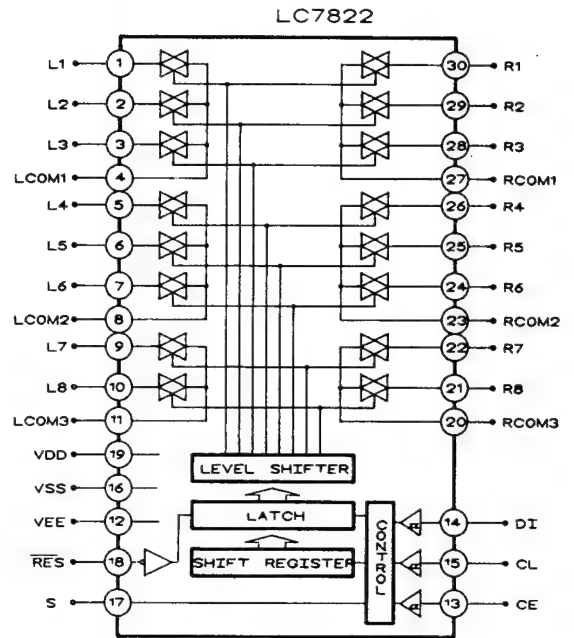


IC702 : MSC 1937-01

FLT SUB MENU INDICATOR

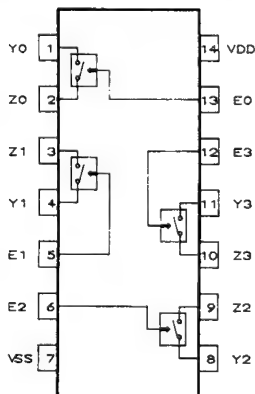


IC502 : LC7822 FUNCTION SELECTOR

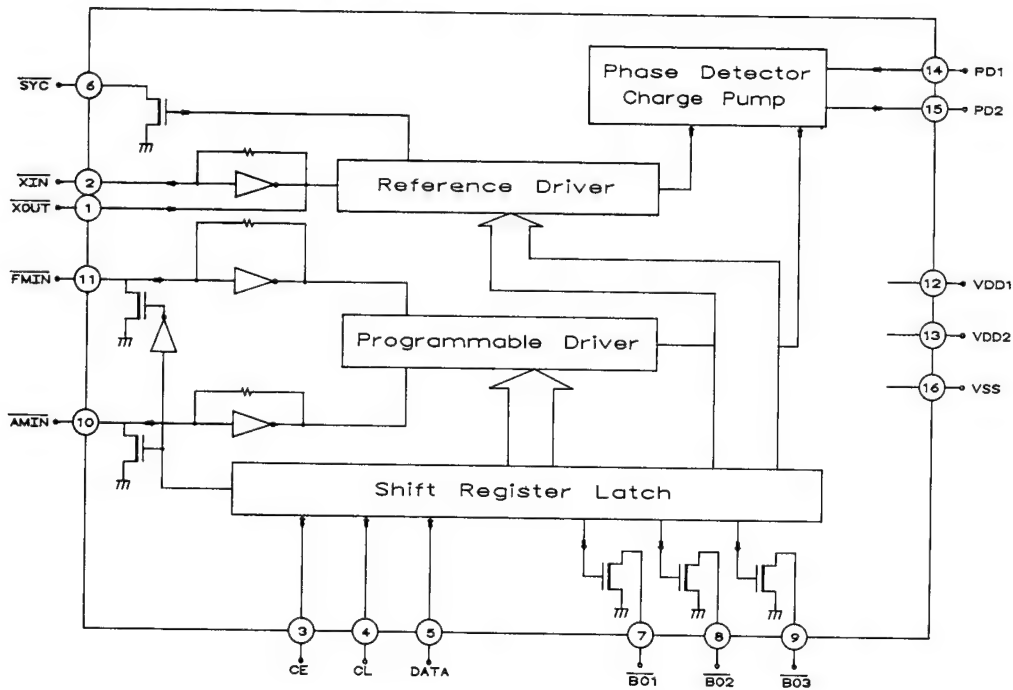


IC501 : GD4066 FUNCTION SELECTOR

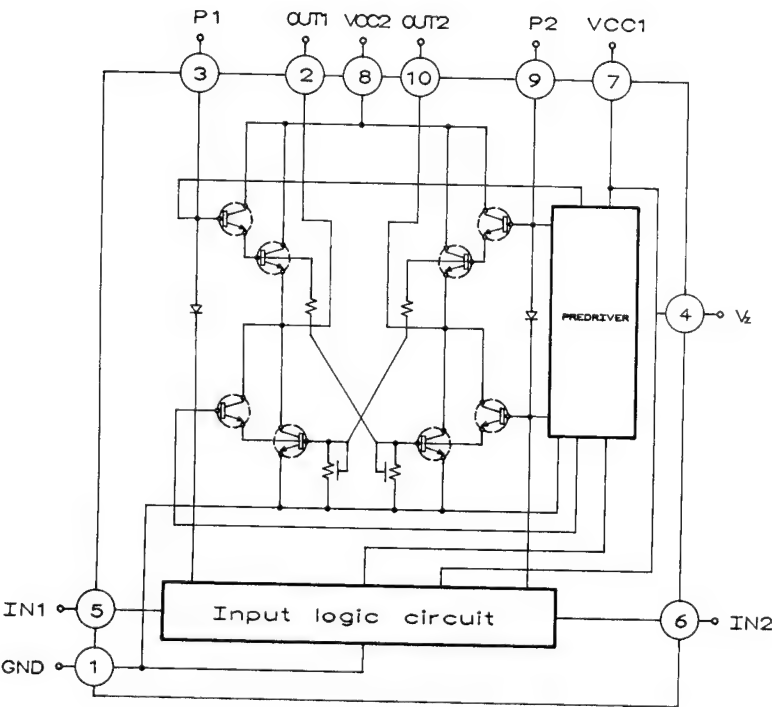
IC501
GD4066 FUNCTION SELECTOR



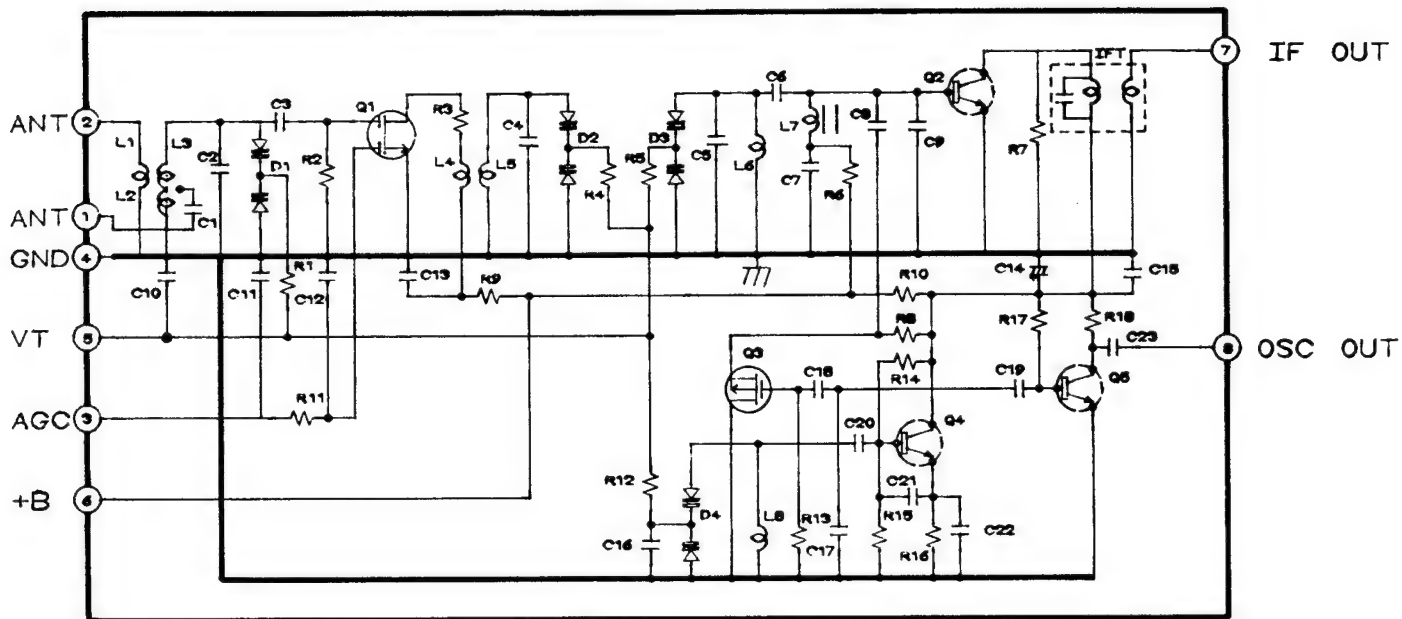
IC401 : LM 7001 PRESCALER



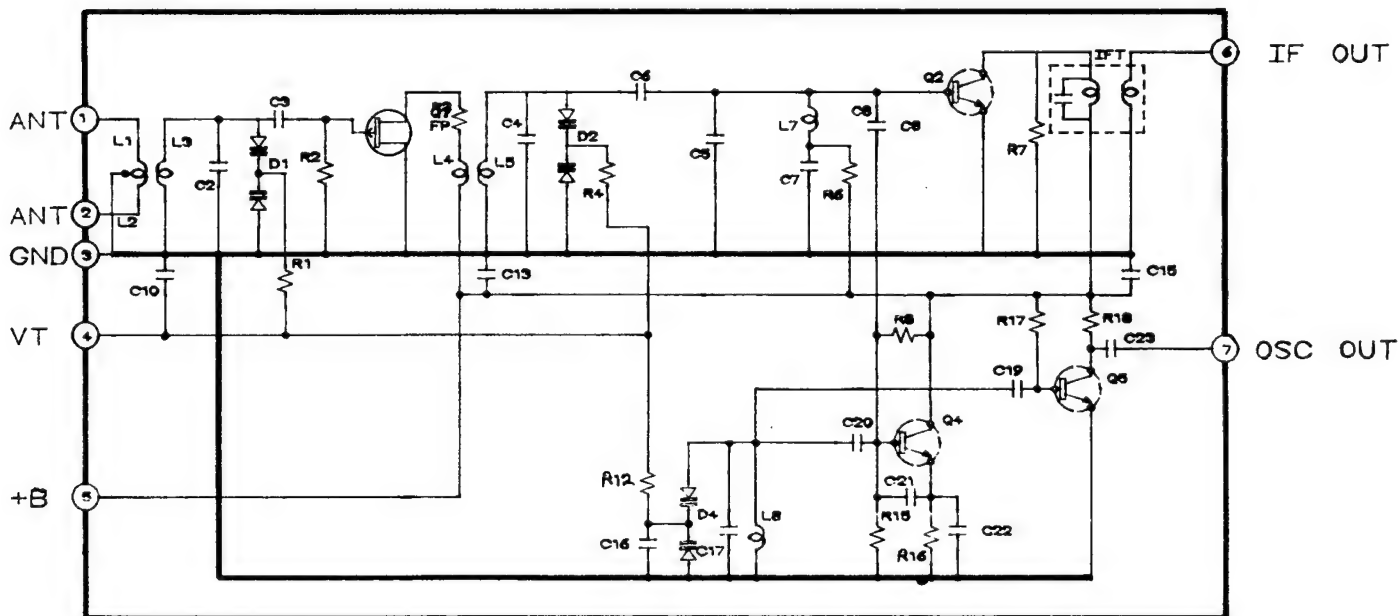
IC1001 : LB1641 MOTOR DRIVE



1. FM FRONT. END(I. IB. BB)
FTH 4-560H



2. FM FRONT. END(USA)
FTH 3-502H

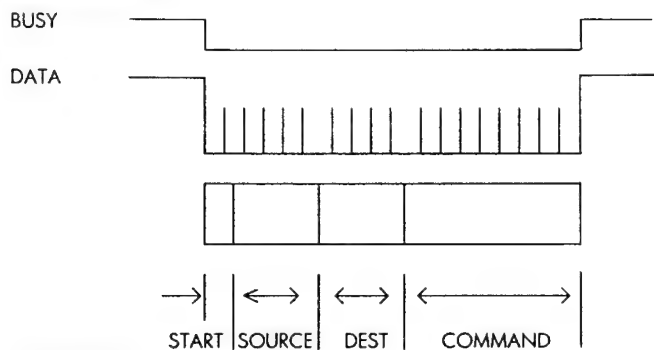


TIMING CHART

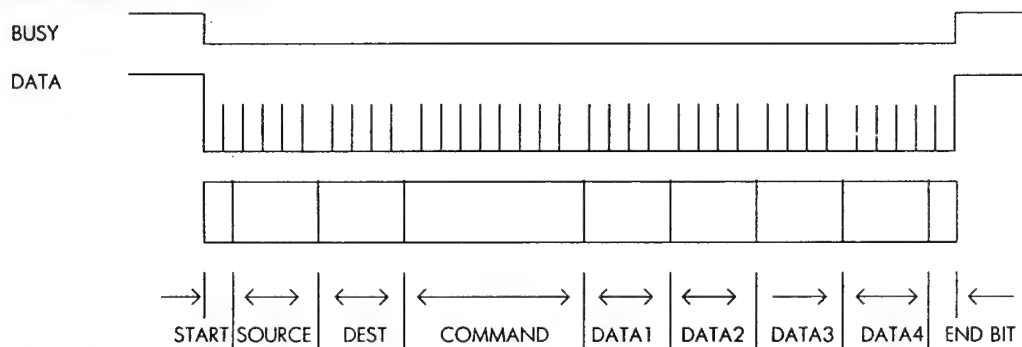
1. System Control Timing Format

Time Base is 560 μ s

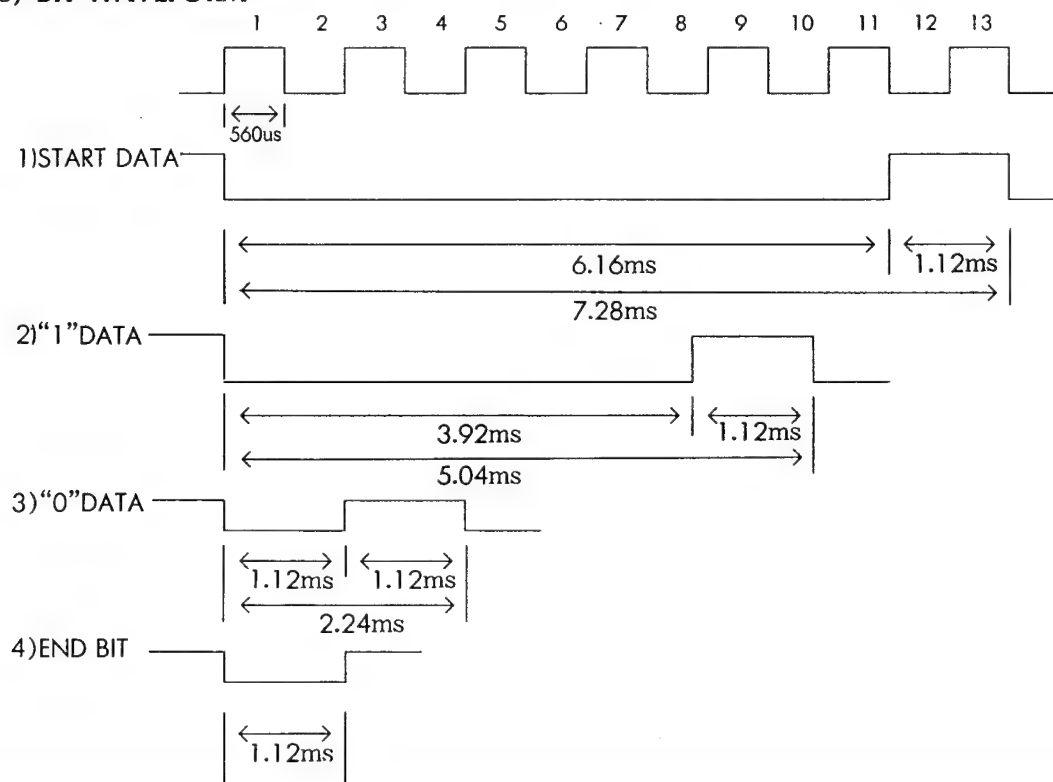
1) COMMAND



2) COMMAND + DATA

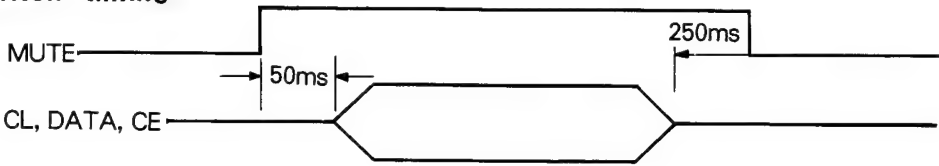


3) BIT WAVEFORM

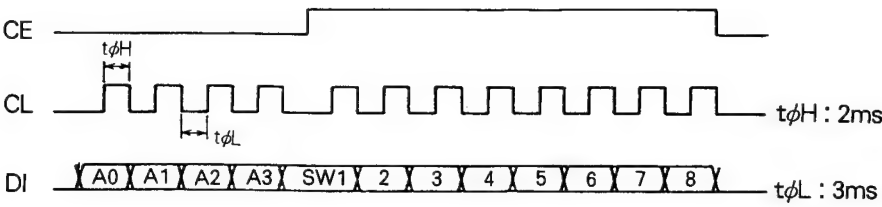


Tuner :

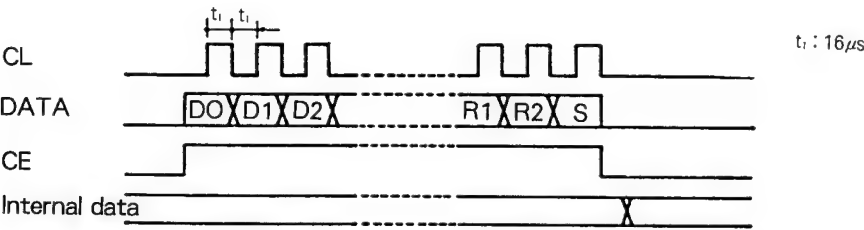
Function switch timing



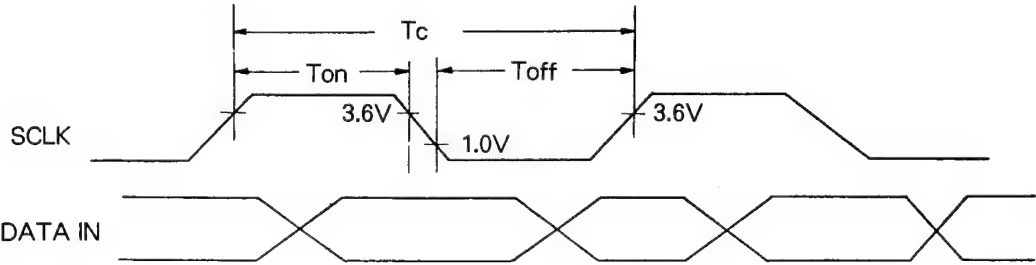
CE, CL, DI waveforms



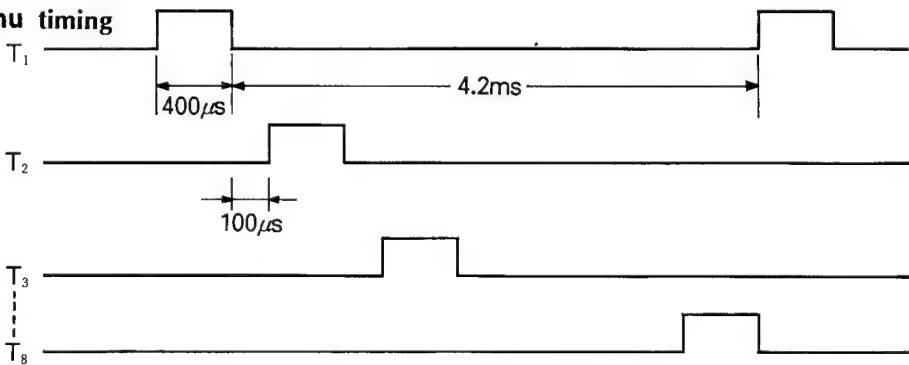
PLL control timing



FLT sub menu control timing

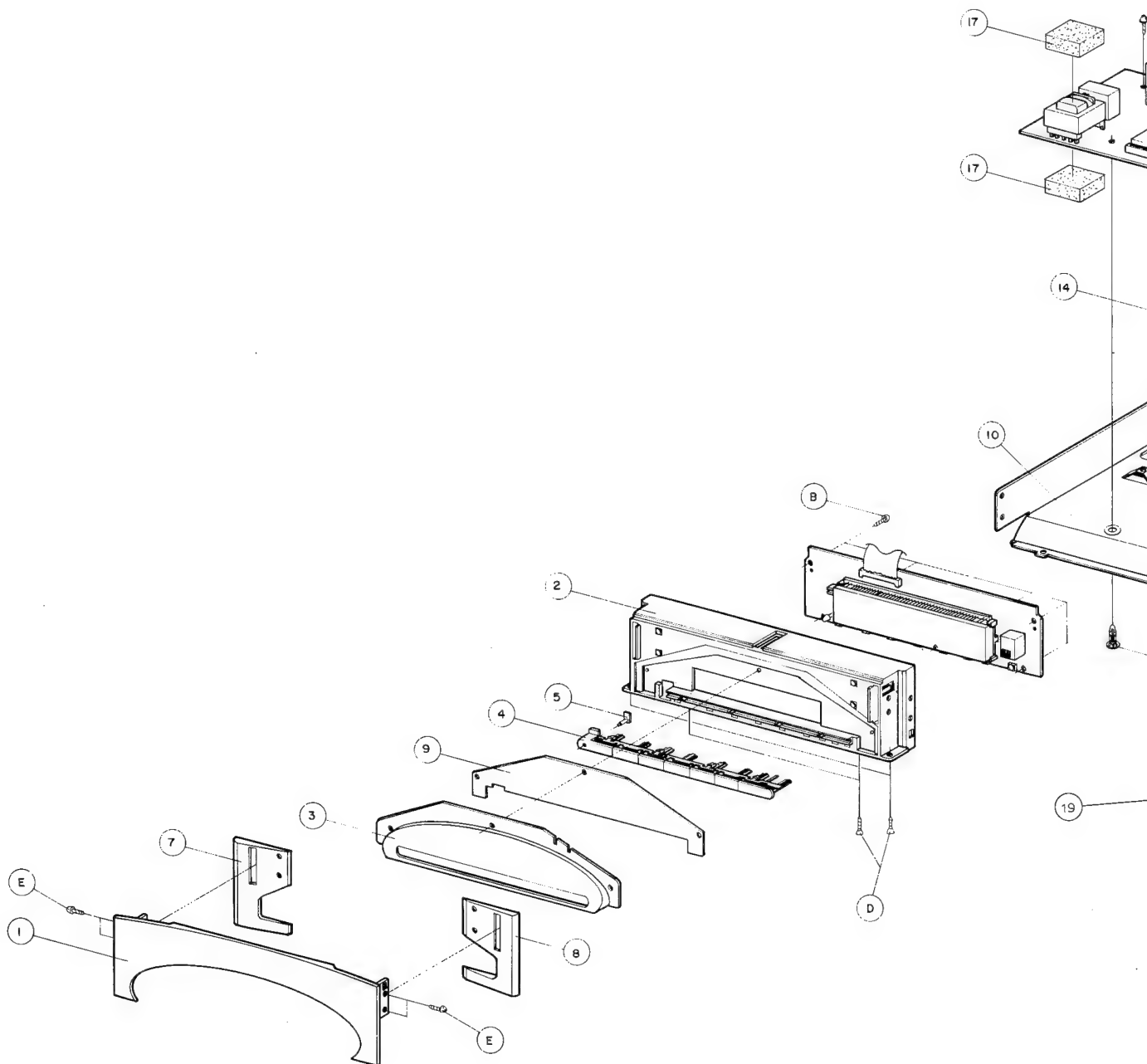


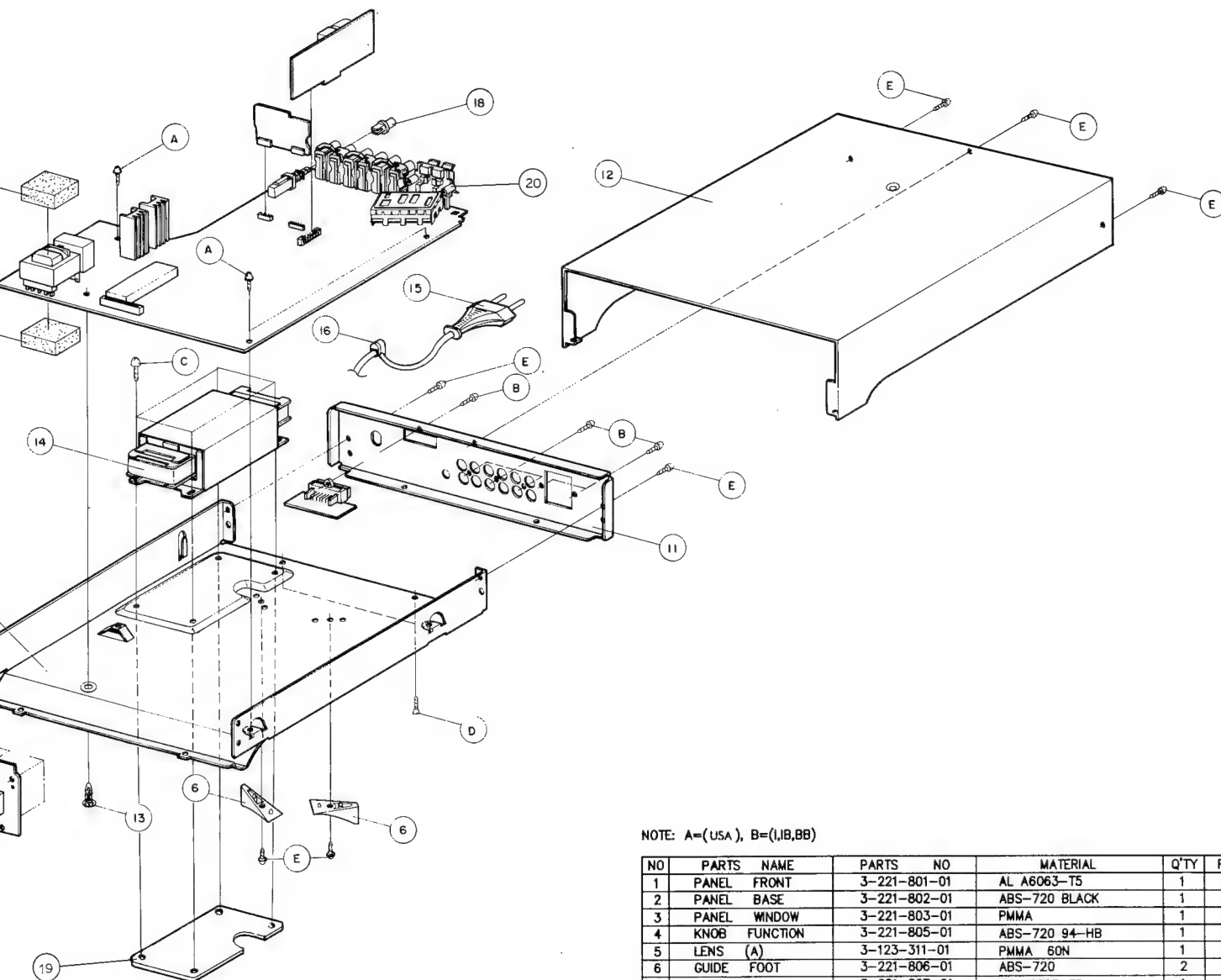
FLT Main menu timing



EXPLODED VIEW

Tuner





NOTE: A=(USA), B=(I,IB,BB)

NO	PARTS NAME	PARTS NO	MATERIAL	Q'TY	REMARK
1	PANEL FRONT	3-221-801-01	AL A6063-T5	1	A,B
2	PANEL BASE	3-221-802-01	ABS-720 BLACK	1	A,B
3	PANEL WINDOW	3-221-803-01	PMMA	1	A,B
4	KNOB FUNCTION	3-221-805-01	ABS-720 94-HB	1	A,B
5	LENS (A)	3-123-311-01	PMMA 60N	1	A,B
6	GUIDE FOOT	3-221-806-01	ABS-720	2	A,B
7	FOOT L	3-221-807-01	AL A6063-T5	1	A,B
8	FOOT R	3-221-808-01	AL A6063-T5	1	A,B
9	FILTER	3-221-814-01	PVC T0.5 WINE COLOR	1	A,B
10	CHASSIS MAIN	3-221-809-02	SECC T1.0	1	A,B
11	PANEL REAR	3-222-101-02	SECC T0.8	1	A
11	PANEL REAR	3-221-810-01	SECC T0.8	1	B
12	CASE BONNET	3-221-811-01	SECC T0.8	1	A,B
13	SUPPORT PCB	3-810-518-01	NYLON 66	1	A,B
14	POWER TRANS	2-131-491-01	120V 60Hz. DC(+,-) 18V	1	A
14	POWER TRANS	2-131-490-01	230V 50Hz. DC(+,-) 18V	1	B
15	CORD AC	2-221-124-02	NDG-023-0	1	A
15	CORD AC	2-211-109-02	NDG-009-0,VDE	1	B
16	BUSHING S/RELIEF	8-201-118-01	HEYCO SR15-1	1	A
16	BUSHING S/RELIEF	8-201-117-01	HEYCO SR14-1	1	B
17	CUSHION CHASSIS	3-810-333-01	RUBBER	2	A,B
18	KNOB PUSH	3-127-802-01	ABS-720	1	A,B
19	COVER SCREW	3-127-802-01	EVA GRAY T5.5X102X66	1	A,B
20	TERMINAL ANT	8-201-118-01	4P BLACK	1	A
20	TERMINAL ANT	2-155-742-01	75 OHM PAL+AM	1	A
A	SCREW	7-344-408-01	ATZ30P080FZK	3	A,B
B	SCREW	7-764-410-01	VBZ30P100FZK	6	A,B
C	SCREW	7-768-420-01	VBZ40P200FZK	4	A,B
D	SCREW	7-464-408-01	CBZ30P080FZK	6	A,B
E	SCREW	7-764-408-01	VBZ30P080FZK	21	A,B

ELECTRICAL PARTS LIST

TUNER T300

REF. No	Part No.	Description
►: I, IB BB	※: USA	△: SAFETY RELATED PARTS.
PCB-1 MAIN P.C. BOARD		
INTERGRATED CIRCUITS		
IC701	2600154011	LE1044, LC866012 CPU(μ -COM)
IC201	2441331721	LA1266 AM.FM IF DET.
IC401	2441330721	LM7001
IC301	2441353721	LA3401 MPX
IC1001	2441348721	LB1641 MOTOR DRIVER
IC502	244136172	LC7822 FUNCTION SELECTOR
IC501	244080731	GD4066B FUNCTION SELECTOR
△ IC1	244121771	MC7812 REGULATOR (+12V)
△ IC2	244123171	KA7912 REGULATOR (-12V)
△ IC3	244143842	KA7806 REGULATOR (+6V)
TRANSISTORS		
Q403, 405, 500	240011835	KTA1266
Q402	240211815	KTC3200
Q101, 102, 103	240210125	KTC3192
► Q201	240211135	KTC3198
Q601, 602, 603, 604, 701	240211135	KTC3198
Q2002	240610715	KSR2001
Q1, 2001	240610815	KSR1001
FIELD EFFECT TRANSISTOR		
Q401	2404111451	2SK246Y
DIODES		
D201, 202	2415080911	SVC321 SPA-DIVAR1-CAP)
△ D1, 2, 3, 4, 5, 6, 7, 8, 9, 10	2413581651	1N4003L
△ D11	242122035	IN 969B, 22V ZENER
D12	242108245	IN 756A, 8.2V ZENER
D402, 403	242110035	IN 758A, 10V ZENER
D1001, 501, 502	242105135	IN 751A, 5.1V ZENER
D401	242105655	IN 752A, 5.6V ZENER
※ D3001, 3002	241017995	1SS133
13, 601, 602, 603, 604, 701, 702, 703, 704	241017995	1SS133
711, 710, 2001, 2002, 2003, 2004		
FILTERS		
F101	2138305011	SFE 10.7 MA8-HA(RED)
※ F102, 103	2138305011	SFF 10.7 MA8-HA(RED)
► F102, 103	2138306011	SFE 10.7MS 3G-HA(RED)
F201	2138312011	SFU 450-B
F202	2138313011	BFU 450-C4N
F301	2138358011	CSB456F11
► F302	213852101	ANT1BODY
F303, 304	213851101	19KHz. MPX
► F0	213860901	BPMB6A 88-108MHz
COILS		
T203	212710901	M7ZN-KS29511N
T204	212943501	AM. OSC
T205	212712401	AM. IFT
T201	212974701	FM. DET1
T202	212974801	FM. DET2
L201	101122221	RC875, 2.2MH, 5%
L701, 702	103447035	RC875, 47 μ H, 5%
CERAMIC TRIMMERS		
TC201, 202	21211701	CVCNO68200

REF. No	Part No.	Description
RESISTORS		
RO, 3, 4, 700	111401025	1Ω, 1/4W, ±5%
R1003	111415025	15Ω, 1/4W, ±5%
R1	111468225	6.8KΩ, 1/4W, ±5%
R2	111533225	3.3Ω, 1/2W, ±5%
R401	111422125	220Ω, 1/4W, ±5%
R5, 6	111810025	10Ω, 1/8W, ±5%
R313, 412, 417	111810125	100Ω, 1/8W, ±5%
R202, 403, 405, 712, 730, 731	111810225	1KΩ, 1/8W, ±5%
▶ R120, 504, 720L	111810325	10KΩ, 1/8W, ±5%
R201, 205, 206, 411, 505, 601, 504, 548	111810325	10K, 1/8W, ±5%
602, 701, 717, 721L		
▶ R218, 320, 321	111810425	100KΩ, 1/8W, ±5%
R213, 214, 905, 906, 911, 914, 916, 918	111810425	100KΩ, 1/8W, ±5%
※ R203	111812325	12KΩ, 1/8W, ±5%
R101	111812225	1.2KΩ, 1/8W, ±5%
R102, 109	111818125	180Ω, 1/8W, ±5%
R105, 110, 220, 408	111818225	1.8KΩ, 1/8W, ±5%
▶ R219	111818325	18KΩ, 1/8W, ±5%
R714	111818325	18KΩ, 1/8W, ±5%
R100	111822025	22Ω, 1/8W, ±5%
R409, 521, 523	111822125	220Ω, 1/8W, ±5%
R104, 606, 607	111822225	2.2KΩ, 1/8W, ±5%
▶ R314, 315	111815525	1.5MΩ, 1/8W, ±5%
R106, 407	111827125	270Ω, 1/8W, ±5%
▶ R203	111827325	27KΩ, 1/8W, ±5%
R322, 323	111827425	270KΩ, 1/8W, ±5%
R107, 113, 901, 902, 907, 909, 910	111833125	330Ω, 1/8W, ±5%
R208, 306, 307, 308, 311	111833225	3.3KΩ, 1/8W, ±5%
R503	111833325	33KΩ, 1/8W, ±5%
R103	111839552	3.9KΩ, 1/8W, ±5%
R514, 515, 600	111847025	47Ω, 1/8W, ±5%
R410, 1001, 1002	111847125	470Ω, 1/8W, ±5%
▶ R211, 215	111847225	4.7KΩ, 1/8W, ±5%
R112, 402, 604, 605, 708, 709, 710	111847225	4.7KΩ, 1/8W, ±5%
R324, 702, 703, 704, 705, 706, 707, 715, 716	111847325	47KΩ, 1/8W, ±5%
※ R720H	111847325	47KΩ, 1/8W, ±5%
R603	111847425	470KΩ, 1/8W, ±5%
R608, 609	111847525	4.7MΩ, 1/8W, ±5%
R404, 406	111856925	5.6Ω, 1/8W, ±5%
▶ R216	111856025	56Ω, 1/8W, ±5%
R204, 114	111856025	56Ω, 1/8W, ±5%
R111	111856125	560Ω, 1/8W, ±5%
▶ R310, 549, 550, 740, 741	111856225	5.6KΩ, 1/8W, ±5%
R207	111868025	68Ω, 1/8W, ±5%
※ R314, 315	111868425	680KΩ, 1/8W, ±5%
R501, 502	111875125	750Ω, 1/8W, ±5%
R520, 522	111875325	75KΩ, 1/8W, ±5%
R903, 904, 912, 913	111815125	150Ω, 1/8W, ±5%
R211	111856325	56KΩ, 1/8W, ±5%
R210, 915, 917	111827225	2.7KΩ, 1/8W, ±5%
▶ R121	111868225	6.8KΩ, 1/8W, ±5%
※ R320, 321	111812425	120KΩ, 1/8W, ±5%
※ R3001, 3002	111522525	2.2MΩ, 1/2W, ±5%
VR201, 202		
VR301		
C601, 602, 603		
C203, 208, 210, 214, 313, 314, 702, 703		
C302, 309, 310, 321, 505, 506		
515, 516, 604		
▶ C220, 226, 301		
C228, 318, 405, 513, 517, 600		
C11, 401, 501, 503		
C7		
C4, 5		
C315		
C8, 9		
C207		
C10		
C407, 408		
C305		
SEMI FIXED RESISTORS		
	251247301	47KΩ, 6MM(RHO615C)
	251222401	220KΩ, 6MM(RHO615C)
CAPACITORS		
	141610865	0.1μF, ±20%, 50V ELEC
	141601065	1μF, ±20%, 50V ELEC
	141310065	10μF, ±20%, 16V ELEC
	141310165	100μF, ±20%, 16V ELEC
	141310165	100μF, ±20%, 16V ELEC
	141210165	100μF, ±20%, 10V ELEC
	141510165	100μF, ±20%, 35V ELEC
	141610165	100μF, ±20%, 50V ELEC
	141622865	0.22μF, ±20%, 50V ELEC
	141322165	220μF, ±20%, 16V ELEC
	141622965	2.2μF, ±20%, 50V ELEC
	141333165	330μF, ±20%, 16V ELEC
	141647865	0.47μF, ±20%, 50V ELEC
	141647965	4.7μF, ±20%, 50V ELEC

REF. No	Part No.	Description	
C13, 100, 211, 219, 1001, 2002	141347065	47 μ F, \pm 20%, 16V	ELEC
C2001	141247165	470 μ F, \pm 20%, 10V	ELEC
C312	141668865	0.68 μ F, \pm 20%, 50V	ELEC
△ C1, 2	141522267	2200 μ F, \pm 20%, 35V	ELEC
▷ C901, 902, 905, 906, 912, 913	1599121451	120 PF, \pm 5%, 50V	MICA
※ 901, 902, 905, 906, 912, 913	188612145	120PF +80% -20% 50V	CER
C3, 102, 204, 205, 409, 1002	175610395	0.01 μ F, +80%. -20%, 50V	CER
C907, 1003	175610495	0.1 μ F, +80%. -20%, 50V	CER
C908, 909, 910, 911	188612145	120 PF, \pm 5%, 50V	CER
C227	188615145	150 PF, \pm 5%, 50V	CER
C410, 411	180618045	18 PF, \pm 5%, 50V	CER(CHI)
▷ C219	175622395	0.022 μ F, +80%. -20%, 50V	CER
C101, 104, 201, 202, 206, 209, 212, 213, 218	175622395	0.022 μ F, +80%. -20%, 50V	CER
224, 225, 319, 402, 406, 502, 504, 514, 518.707			
C304, 903, 904	188633145	330 PF, \pm 5%, 50V	CER
C303, 700, 420	175647395	0.047 μ F, +80%. -20%, 50V	CER
※ 3001, 3002	175647395	0.047 μ F +80% -20% +50V	CER
※ C307, 308	188668145	680 PF, \pm 5%, 50V	CER
▷ C307, 308	1886471	470 PF, \pm 5%, 50V	CER
C704	171668255	0.0068 μ F, \pm 10%, 50V	CER
△ ▷ C12	1998104011	0.01 μ F 250V	CER
△ ※ C12	199810107	0.01 μ F 250V	CER
C412 (M)	150647345	0.047 μ F, 5%, 50V	MYL
C234(S)	153643141	430 PF, \pm 5%, 50V	PPP
C701	1991134011	DB-5R5D104	
MISCELLANEOUS			
X401	213810201	7.2 MHz	
X701	2138184011	CST 8.0 MTW	
▷ FRONT END	212511801	FTH-560H	
※ FRONT END	212512001	FTH3-502HA	
SW1	220237301	SPWN19	
CABLE CARD	216831701	30P, 150M	
WA1	216830701	30P, VERTICAL TYPE	
WA8	2138382011	2MM, 5P	
WA7	216838401	2MM, 9P	
WA9, 10	216847901	BMW250-05, 5P	
WA2	216848001	YMW025-02, 2P	
WA6	216848201	YMW025-03, 6P	
WA3	216845901	YW396-03AV, 2P	
WA4	216848101	YMW025-03 3P	
CABLE HOLDER	216300501	6P	
CN1	215857901	W-D0604#01	
RCA JACK *3	215561801	4P	
ANT	215574201	75 OHM, PAL + AM	
※ ANT	215577801	4P BLACK	
HEATSINK *2	371070203	40MM	
△ ▷ REL	2140131011	VS-12MBU-5, 12V, 10A	
△ ※ REL	2140225021	JW1AFSN-DC12V	
IC SOCKET	215519401	WSD1F-64T(1.78MM) IC SOCKET	
△ FUSE HOLDER *2	299911401	PBSP-H 0.3T	
▷ TRANS2	213147601	AC 230V 50Hz	
△ ※ TRANS2	213136901	AC 120V 60Hz	
EARTH WIRE	289960101	1P 100MM	
TERMINAL WRAPPING *6	215537701	NKC-007-B	
※ EARTH WIRE	289961501	1P 40MM	

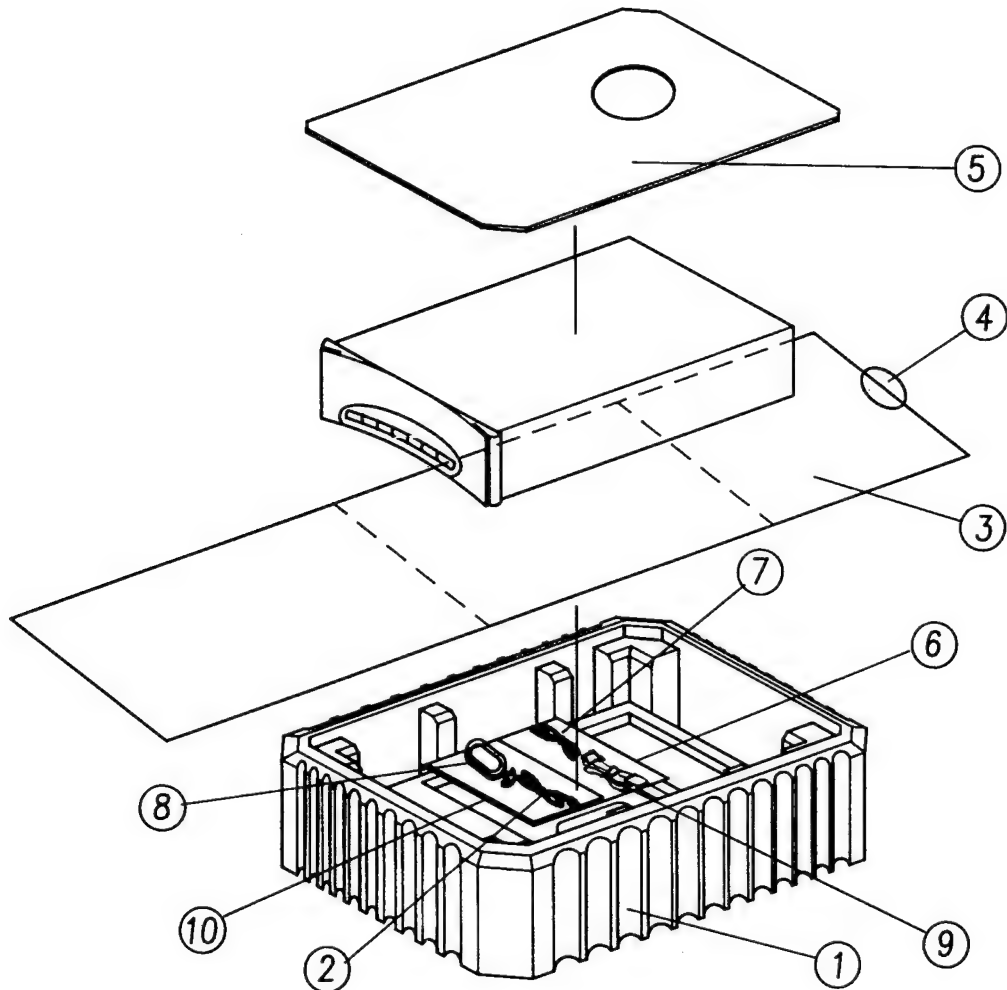
PCB-2 MOTOR CONTROL P.C. BOARD

TRANSISTORS			
Q503, 504	240211134	KTC3198	
Q2003, 2004	240215425	2 SC 2878-B	
RESISTORS			
R2001, 2002	111810325	10 K Ω , $\frac{1}{8}$ W, \pm 5%	
R532, 534	111839125	390 Ω , $\frac{1}{8}$ W, \pm 5%	
R541, 542	111847025	47 Ω , $\frac{1}{8}$ W, \pm 5%	
R915, 917	111827225	2.7 K Ω , $\frac{1}{8}$ W, \pm 5%	
R533, 536	111410225	1K Ω , $\frac{1}{4}$ W, \pm 5%	
R528, 529	111810225	1 K Ω , $\frac{1}{8}$ W, \pm 5%	
R531, 537	111815425	150 K Ω , $\frac{1}{8}$ W, \pm 5%	
R530, 535	111891325	91 K Ω , $\frac{1}{8}$ W, \pm 5%	
CAPACITORS			
C519, 520	141310065	10 μ F, \pm 20%, 16V	ELEC
C541, 544	141310165	100 μ F, \pm 20%, 16V	ELEC
C1003	175610495	0.1 μ F, +80%, -20%, 50	CER
C542, 543	175622395	0.022 μ F, +80%, -20%, 50	CER
C530, 531	141668965	6.8 μ F \pm 20%, 50V	ELEC

M1		MISCELLANEOUS		
WA8-A		2501384011		EUW MOF F25, A54
WA7-A		2168389011		2MM, 5P
		2168391011		2MM, 9P
REF. No	Part No.	Description		
PCB-3 BUFFER AMP P.C. BOARD				
RESISTORS				
R621, 622	111822125	220Ω, 1/8 W, ±5%		
R623, 625	111847225	4.7KΩ, 1/8 W, ±5%		
R624, 626	111875325	75KΩ, 1/8 W, ±5%		
CAPACITORS				
C623, 624, 626, 627	141310065	10 μF, ±20%, 16V		ELEC
C621, 622	141347065	47 μF, ±20%, 16V		ELEC
C625, 628	188633045	33 PF, 50% 50V		CER
INTERGRATED CIRCUITS				
IC601	244123671	KA4558C		
MISCELLANEOUS				
WA9-A, WA10-A	216847801	BMH250-05R, 5P		
PCB-4 CONTROL P.C. BOARD				
INTERGRATED CIRCUITS				
IC801	24404F14011	MSC1937-01		
TRANSISTORS				
Q801, 802, 803	240610815	KSR1001		
DIODES				
D810, 811, 812, 813, 814, 815, 816, 817 818, 819	241017995	1SS133		
RESISTORS				
R807, 841	111810125	100Ω, 1/8 W, ±5%		
R804	111810325	10KΩ, 1/8 W, ±5%		
R806	111812325	12KΩ, 1/8 W, ±5%		
R801	111818025	18Ω 1/8 W, ±5%		
R802, 803	111822325	22KΩ 1/8 W, ±5%		
R805	111833125	330Ω 1/8 W, ±5%		
R808, 811, 812, 813, 814, 815, 816, 817 818, 819, 820, 821, 823, 824, 825 826, 827, 828, 828, 830, 831, 832, 833 834, 835, 836, 837, 838, 839, 840	111847325	47KΩ, 1/8 W, ±5%		
CAPACITORS				
C804	141347065	CEA 47μF, ±20%, 16V		ELEC
C802, 803	141447065	CEA 47μF, ±20%, 25V		ELEC
MISCELLANCEOUS				
S801, 802, 803, 804, 805, 806, 807, 808	22089901	177-620-002		
FLT	214325501	24-MT-01GK		
WA1-A	216828901	30P, ANGLE TYPE		
REMOTE	212581601	KRM-91M(38KHz)		
FLT HOLDER	322180401	ABS		
ID812	241918335	R54MC F07		
CABLE HOLDER	216300301	4P		
EARTH WIRE	289960101	1P 100MM		
PCB-5 RIBBON P.C. BOARD				
WA5	216846901	13P BLACK		
WA6	216848201	YMW 025-06 6P		
CABLE HOLDER	216300501	6P		
FUSE * 2	2998225011	TIA/250V		
MISCELLANCEOUS				
△ ► TRANS1	213149001	AC230V 50HZ		
△ * TRANS1	213149101	AC120V60HZ		

PACKING DRAWING

Tuner



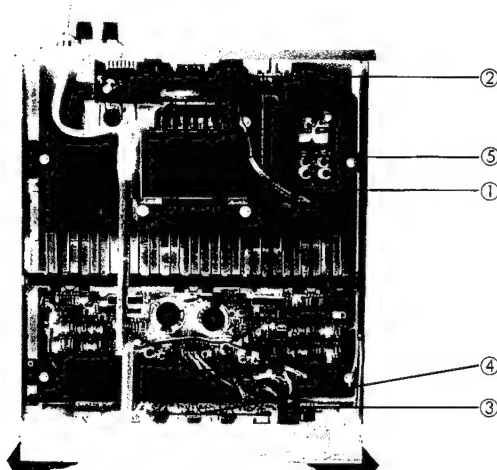
NO	PARTS NAME	PARTS NO.	Q'TY
1	PAD BOTTOM	3-127-916-01	1
2	PIN CORD	2-212-141-01	2
3	SHEET POLY	3-324-029-01	1
4	STICKER SET	3-819-817-01	1
5	INNER LID	3-324-019-01	1
6	BAG POLY	3-219-009-01	1
7	ANT FM	2-213-103-01	1
8	LOOP ANTENNA AM	2-213-353-02	1
9	CONNECTOR ASS'Y	2-159-978-02	1
10	MANUAL SHEET	3-221-823-01	1

AMPLIFIER SECTION

2 HK-A300

INTERNAL VIEW

■ TOP VIEW



- ① PCB-1 Main p.c.board
- ② PCB-2 Power Transformer p.c.board
- ③ PCB-3 Control p.c.board
- ④ PCB-4 Control p.c.board
- ⑤ Power Transformer.

DISASSEMBLY PROCEDURES

1 TOP Cover Removal

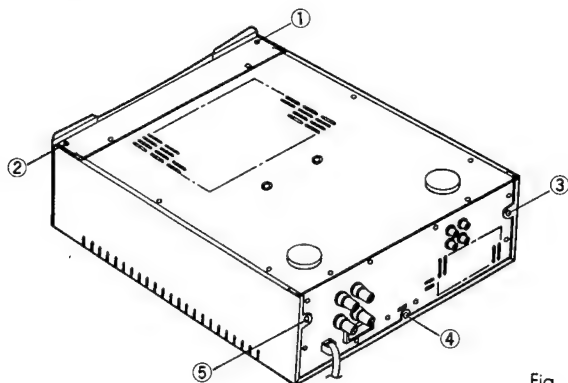


Fig. 1

1. Remove screws ① to ⑤ in Fig. 1
2. Remove the top cover

2 Bottom Cover Removal

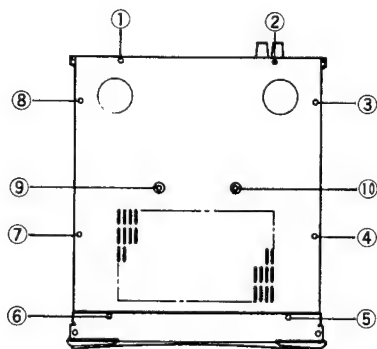


Fig. 2

1. Remove screws ① to ⑪, and then remove the bottom cover in Fig. 2

3 Rear Panel Removal

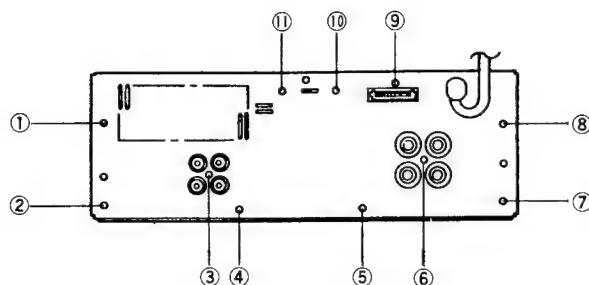


Fig. 3

1. Remove screws ① to ⑪, and then remove the rear panel in Fig.3

4 1 PCB-7 (Power Trans Former PCB) Removal

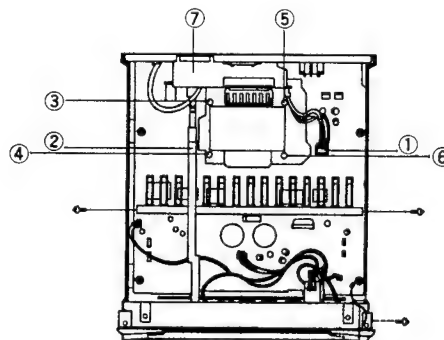


Fig. 4

1. Remove the rear panel in Fig. 3 (Refer to step ③)
2. Remove connector ①, Remove Switch rod ② from speaker selector switch
3. Remove screws ③ to ⑥, and then remove the pcb-2 ⑦ with the power trans

5 PCB-15 (Main PCB) Removal

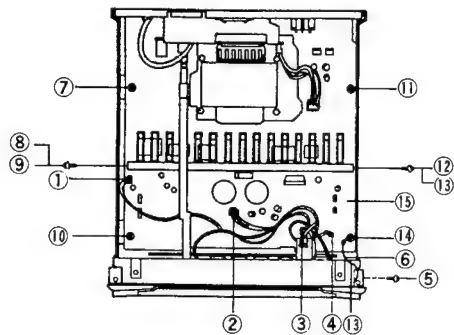


Fig · 5

1. Remove the pcb-2 (Refer to step 4)
2. Remove connectors ① to ④ in Fig. 5
3. Remove screws ⑤, and then untie the ground wire ⑥ in Fig. 5
4. Remove screws ⑦ to ⑬, and then remove the main pcb-15

6 Front Panel Assembly Removal

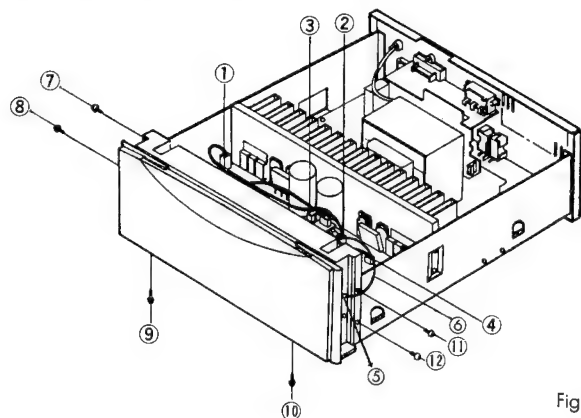


Fig · 6

1. Remove connectors ① to ④ in Fig · 6
2. Remove screws ⑤, and then untie the ground wire ⑥ in Fig. 6
3. Remove screws ⑦ to ⑬, and then remove the front panel assembly by pulling it toward you gently.

7 PCB-2, 7 (Control PCB) Removal.

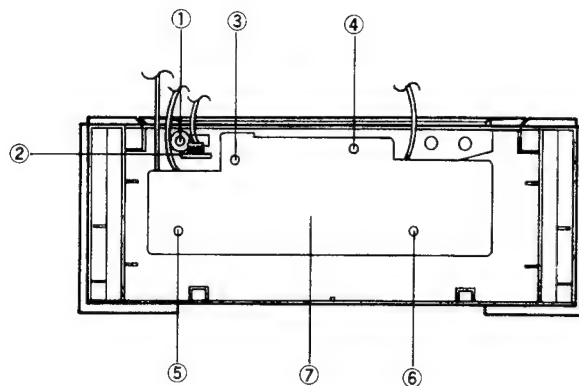


Fig · 7

1. Remove the front panel assembly from the unit in Fig · 6 (Refer to step 6)
2. Remove screws ①, and then remove the pcb-3 ② in Fig. 6
3. Remove screws ③ to ⑥, and then remove the pcb-4 ⑦ in Fig. 6

ALIGNMENT PROCEDURES

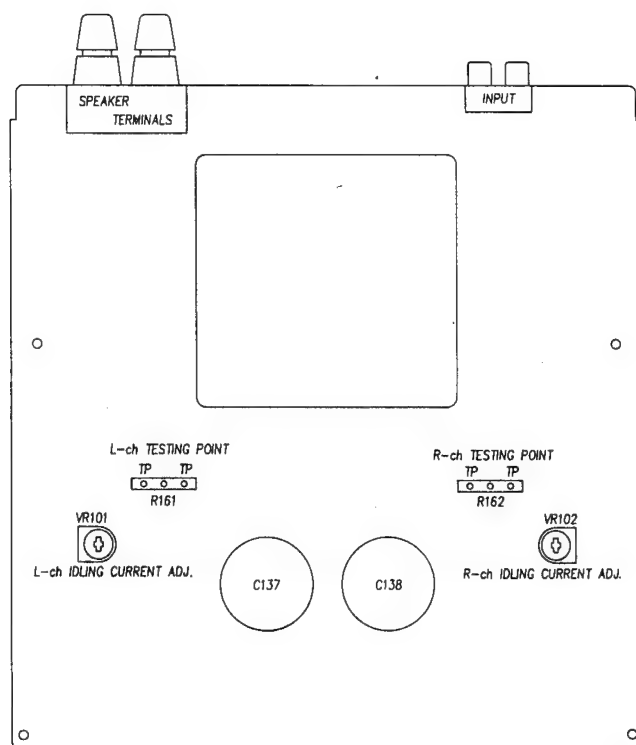
Amplifier : A-300

- Conditions:
- Set the Volume control of Tuner to minimum.
 - Set the Speaker switches to "off" position.
 - Make the adjustment at a room temperature of 77°F (25°C).
 - After the Power Switch of Tuner is pushed on, Wait for 60 minutes before measuring to be sure of the most stable operation.

- △ NOTE :
- Power amplifier can be serviced without TUNER by shorting Points PIN No. AC1 and JUMPER WIRE No. J93 AC2
 - DC OFFSET VOLTAGE should be less than 100mV after POWER ON 12sec.

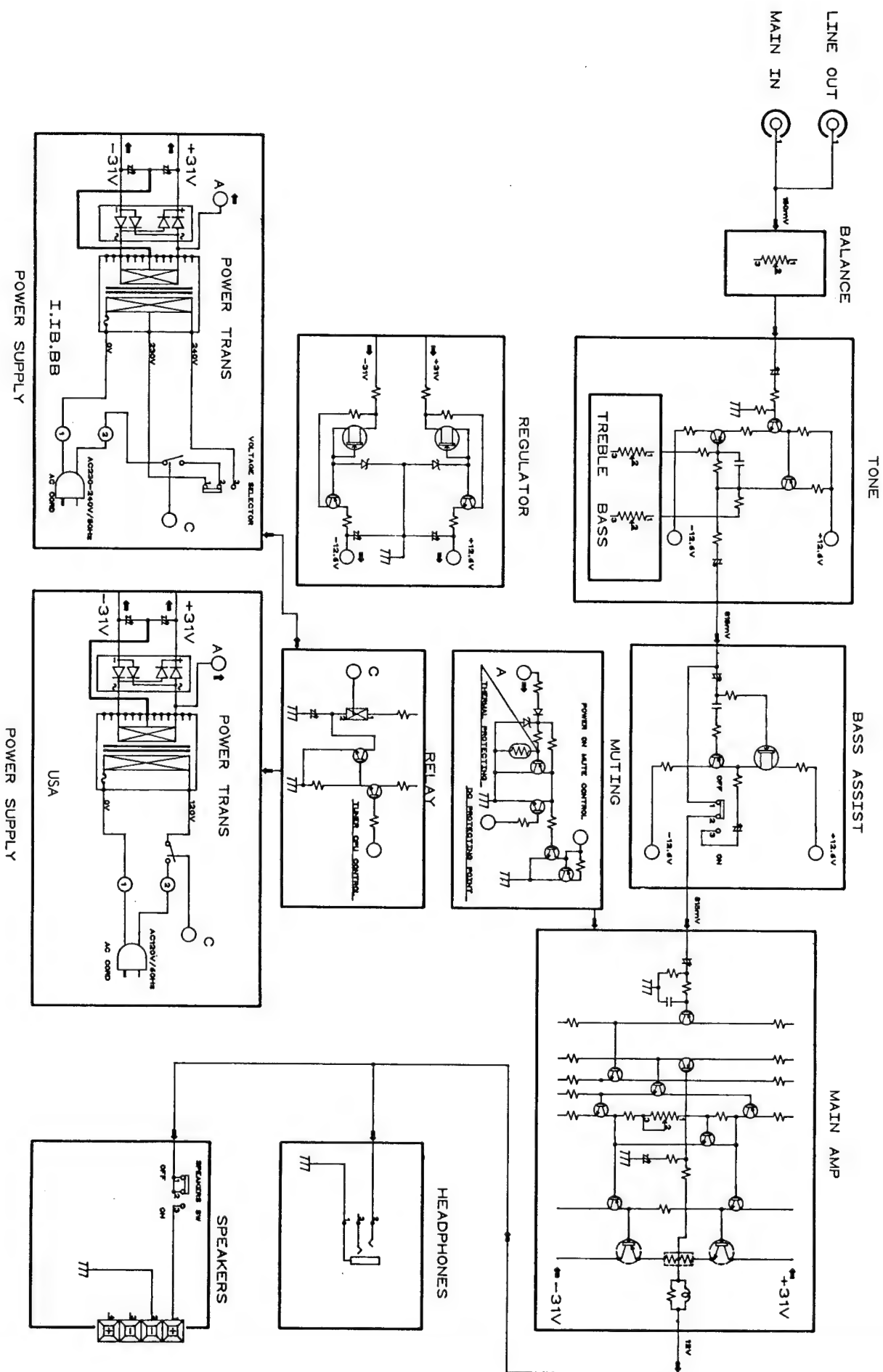
■ IDLING CURRENT ADJUSTMENT

STEP	Connection Equipments	Adjustment	FOR
1	Connect the Digital Volt Meter to both side of R161	VR101(L-Ch)	26mV ± 2mV
2	Connect the Digital Volt Meter to both side of R162	VR102(R-ch)	26mV ± 2mV



A300 Adjustment point

A-300 AMPLIFIER BLOCK DIAGRAM



CIRCUIT DESCRIPTION

Amplifier : A300

■ TONE CONTROLS.

Fig 1 shows the basic tone control circuit. The tone amplifier is a DC-coupled amplifier

The tone circuit constitutes INPUT small signal Transistor (Q201) OUTPUT small signal Transistor (Q205) and CONSTANT current Transistor (Q203). Tone control (Bass, Treble) is accomplished by providing the tone amplifier NFB circuit with a frequency selective characteristic. (Bass:50Hz, Treble:10kHz)

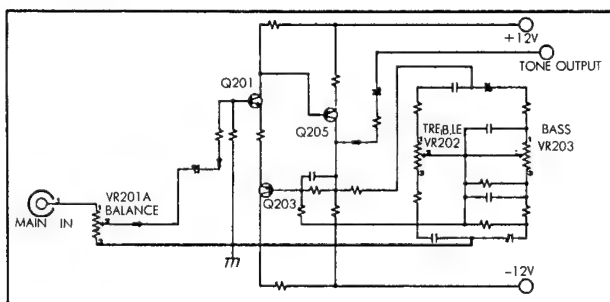


Fig. 1

■ BASS ASSIST

Fig 2 shows the BASS ASSIST circuit.

The BASS ASSIST circuit consists of CONSTANT current F. E. T (Q207) and small signal transistors (Q209, Q211).

This circuit is active low cut filter. (Accent frequency is 55Hz).

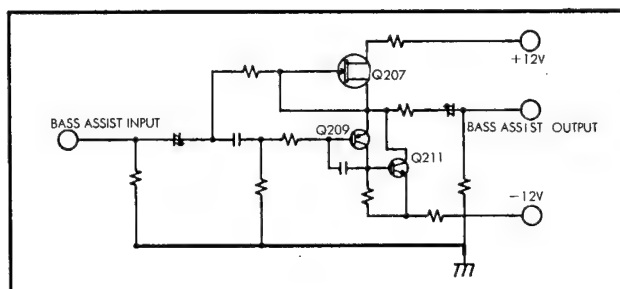


Fig. 2

■ POWER AMPLIFIER SECTION

The basic circuit arrangement of the power amplifier is shown in Fig 3. The first stage is a differential amplifier comprising PNP two transistors (Q103, Q107).

The pre-drive stage consists of ultra low capacitance transistors (Q113, Q115).

The power stage bias voltage is supplied by the transistor (Q117).

The power stage consists of drive transistors (Q119, Q121) and power transistors (Q125, Q127).

The power amplifier has a over-output current protection circuit. If current exceeding the specification flows through Q125 & Q127(L-ch), Q123 & Q135 Will conduct. As result Q133 will switch OFF, and the mute line will go low(MUTE). The thermal protection circuit consists of Transistors (Q134, Q138) and posistor PO 101. When heat sink temperature exceeds 95°C, Q136 & Q134 switch ON and the MUTE line goes low(MUTE).

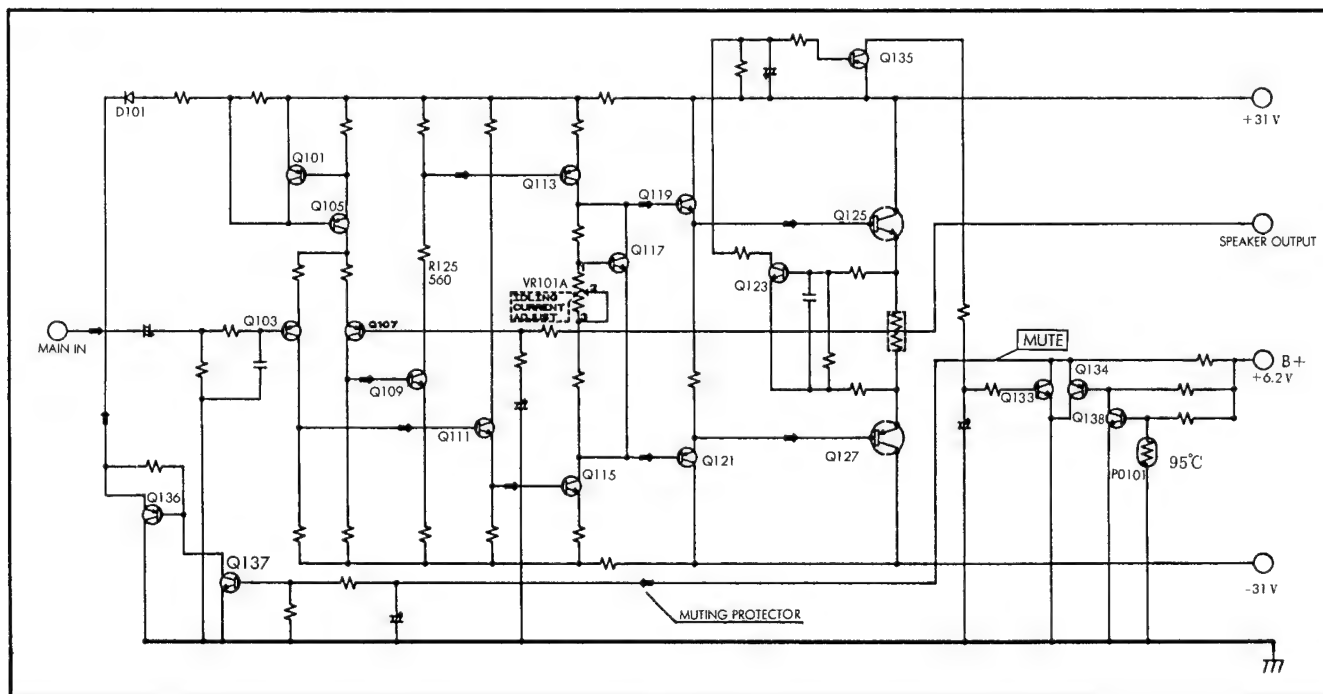
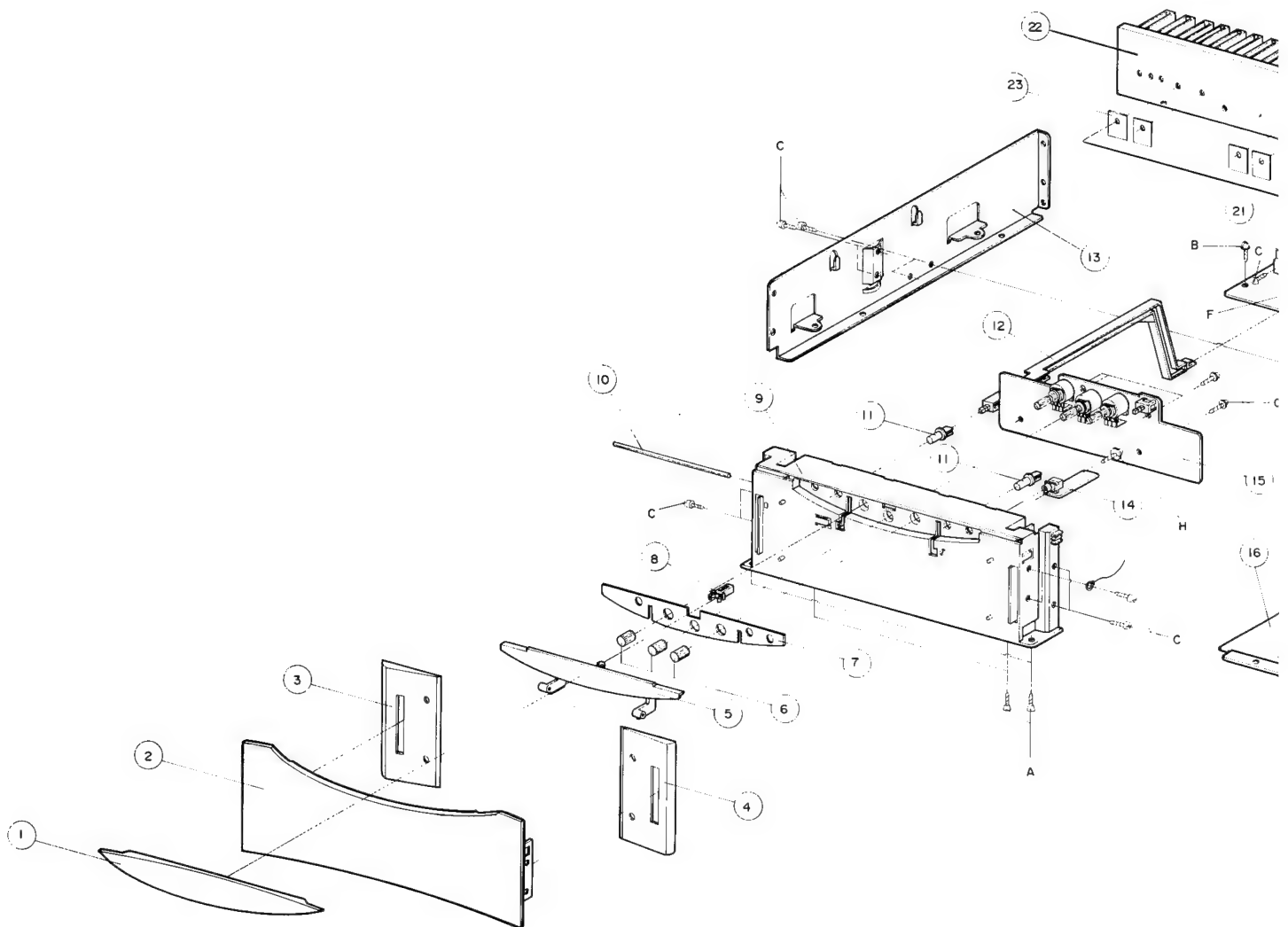
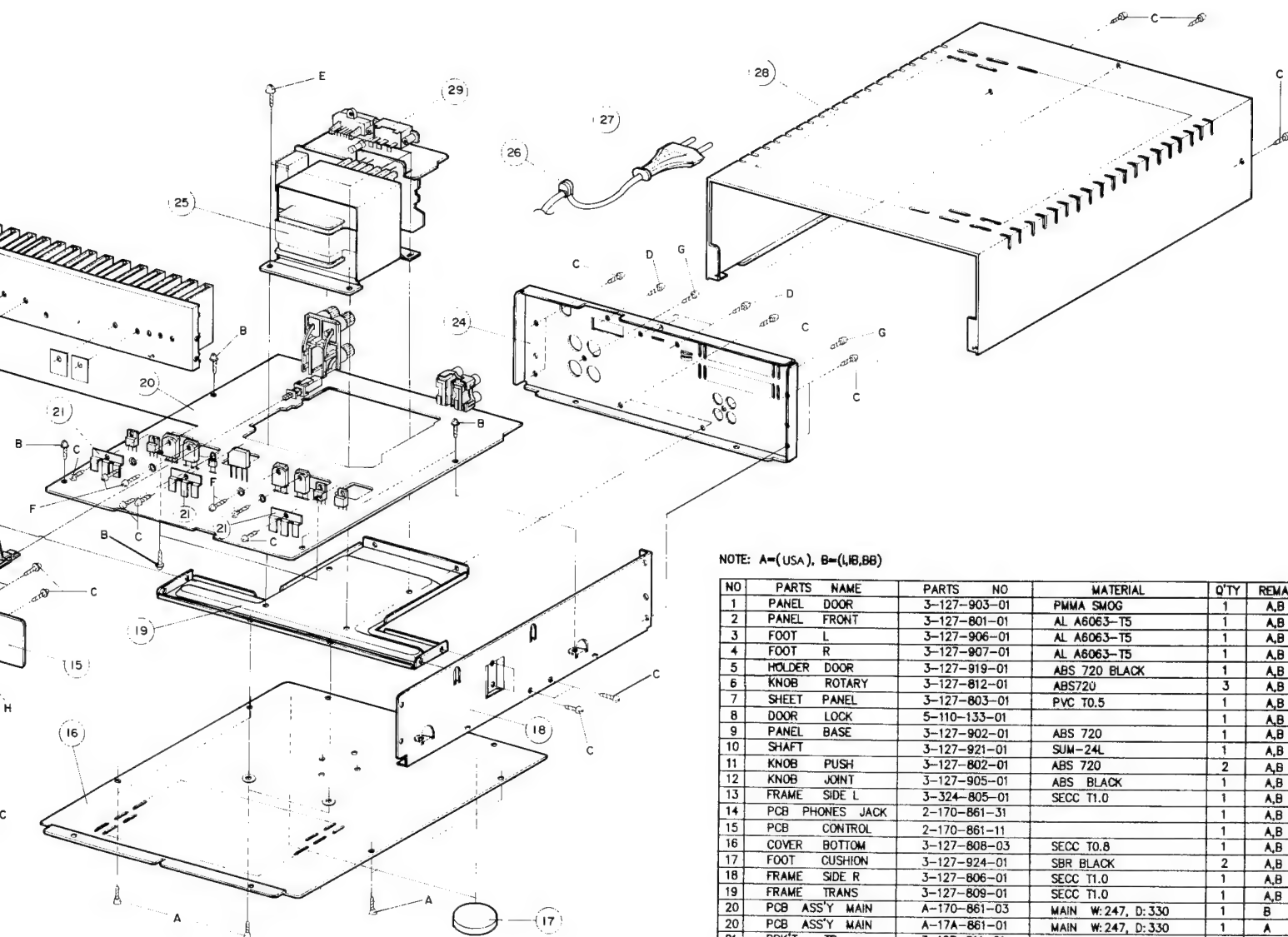


Fig. 3

EXPLODED VIEW

Amplifier : A300





NOTE: A=(USA), B=(L,B,BB)

NO	PARTS NAME	PARTS NO	MATERIAL	Q'TY	REMARK
1	PANEL DOOR	3-127-903-01	PMMA SMOG	1	A,B
2	PANEL FRONT	3-127-801-01	AL A6063-T5	1	A,B
3	FOOT L	3-127-906-01	AL A6063-T5	1	A,B
4	FOOT R	3-127-807-01	AL A6063-T5	1	A,B
5	HOLDER DOOR	3-127-919-01	ABS 720 BLACK	1	A,B
6	KNOB ROTARY	3-127-812-01	ABS720	3	A,B
7	SHEET PANEL	3-127-803-01	PVC T0.5	1	A,B
8	DOOR LOCK	5-110-133-01		1	A,B
9	PANEL BASE	3-127-902-01	ABS 720	1	A,B
10	SHAFT	3-127-921-01	SUM-24L	1	A,B
11	KNOB PUSH	3-127-802-01	ABS 720	2	A,B
12	KNOB JOINT	3-127-905-01	ABS BLACK	1	A,B
13	FRAME SIDE L	3-324-805-01	SECC T1.0	1	A,B
14	PCB PHONES JACK	2-170-861-31		1	A,B
15	PCB CONTROL	2-170-861-11		1	A,B
16	COVER BOTTOM	3-127-808-03	SECC T0.8	1	A,B
17	FOOT CUSHION	3-127-924-01	SBR BLACK	2	A,B
18	FRAME SIDE R	3-127-806-01	SECC T1.0	1	A,B
19	FRAME TRANS	3-127-809-01	SECC T1.0	1	A,B
20	PCB ASS'Y MAIN	A-170-861-03	MAIN W:247, D:330	1	B
21	PCB ASS'Y MAIN	A-17A-861-01	MAIN W:247, D:330	1	A
22	BRK'T TR	3-127-811-01	PB T0.6	3	A,B
23	HEAT SINK	3-127-810-01	AL A6063-T5	1	A,B
24	MICA SHEET	3-120-630-01	18.5 x 22	4	A,B
25	PANEL REAR	3-127-804-01	SECC T0.8	1	B
26	PANEL REAR	3-128-601-01	SECC T0.8	1	A
27	POWER TRANS	2-131-489-01	AC 230V 2.7A	1	B
28	POWER TRANS	2-131-494-01	AC 120V/60HZ 2.7A	1	A
29	FUSE	2-188-619-01	5.2 x 20 250V 1.25A	1	B
29	FUSE	2-188-640-01	5.2 x 20 250V 2.5A	1	A
A	SCREW	7-464-408-01	CBZ30P080FZK	10	A,B
B	SCREW	7-344-408-01	ATZ30P080FZK	6	A,B
C	SCRE /	7-764-408-01	VBZ30P080FZK	46	A,B
D	SCREW	7-764-410-01	VBZ30P100FZK	3	A,B
E	SCREW	7-768-408-01	VBZ40P080FZK	4	A,B
F	SCREW	7-999-164-01	VBZ30P120FZK+SPRING	4	A,B
G	SCREW	7-999-166-01	PTB30P100FZK	2	A,B
H	SCREW	7-999-163-01	S30C	1	A,B

ELECTRICAL PARTS LIST

Amplifier A300

Ref. No

Part No.

Description

CHASSIS MISCELLANEOUS

△ P1	221110902	AC LINE CORD (I, IB, BB)
△ T1	221112402	AC LINE CORD (USA)
	213148901	POWER TRANSFORMER (I, IB, BB)
	213149401	POWER TRANSFORMER (USA)
△ FU301	218861901	FUSE T1.25A/250V (I, IB, BB)
	218864001	FUSE F2.5A/250V (USA)

PCB-1 MAIN (P.C. BOARD)

RESISTOR

△ R161, 162	139021401	0.22Ω, 5W+5W
△ R165, 166	114110023	10Ω, 1W, ±5%
△ R185, 186	114168123	680Ω, 1W±5%
△ R183, 184	130447925	4.7Ω, 1/4W, ±5% FUSE
△ R141, 142, 147, 148	130447025	47Ω, 1/4W, ±5% FUSE
△ R177, 178	130433125	330Ω, 1/4W, ±5% FUSE
△ R163, 164	130410025	10Ω, 1/4W, ±5% FUSE
R167, 174	111410425	100KΩ, 1/4W, ±5%
R109, 110	111410325	10KΩ, 1/4W, ±5%
R159, 160	111410225	1KΩ, 1/4W, ±5%
R113, 114, 115, 116, 135, 136	111415225	1.5KΩ, 1/4W, ±5%
R143, 144, 145, 146	111422325	22KΩ, 1/4W, ±5%
R169	111422225	2.2KΩ, 1/4W, ±5%
R101, 102	111822225	2.2KΩ, 1/8W, ±5%
R179, 180	111422025	22Ω, 1/4W, ±5%
R131, 132	111427225	2.7KΩ, 1/4W, ±5%
R119, 120	111427125	270Ω, 1/4W, ±5%
R103, 104, 107, 108, 170	111433325	33KΩ, 1/4W, ±5%
R176, 187	111433225	3.3KΩ, 1/4W, ±5%
R105, 106, 155, 156	111433125	330Ω, 1/4W, ±5%
R149, 150	111436325	36KΩ, 1/4W, ±5%
R177	111439225	3.9KΩ, 1/4W, ±5%
R153, 154, 172, 173, 175	111447225	4.7KΩ, 1/4W, ±5%
R111, 112, 117, 118, 178	111447125	470Ω, 1/4W, ±5%
R121, 122, 123, 124, 125, 126, 127, 128, 129, 130	111456125	560Ω, 1/4W, ±5%
R133, 134, 139, 140	111456025	56Ω, 1/4W, ±5%
R168, 171	111468325	68KΩ, 1/4W, ±5%
R158	111482125	820Ω, 1/4W, ±5%
R151, 152	111482025	82Ω, 1/4W, ±5%
R157	111491125	910Ω, 1/4W, ±5%
R137, 138	111439125	390Ω, 1/4W, ±5%

CONTROLS

VR101, 102	251247101	470Ω
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CAPACITOR

C129, 142	141601065	1μF, ±20%, 50V, ELEC
C115, 116	141310065	10μF, ±20%, 16V, ELEC
C140, 141	141610065	10μF, ±20%, 50V, ELEC
C130	141210165	100μF, ±20%, 10V, ELEC
C131, 132, 133, 134	141422165	220μF, ±20%, 25V, ELEC
C103, 104	141247065	47μF, ±20%, 10V, ELEC
C119, 120	141447965	4.7μF, ±20%, 25V, ELEC
C109, 110, 111, 112, 135, 136	141647065	47μF, ±20%, 50V, ELEC
C111, 112	141147165	470μF, ±20%, 6.3V, ELEC
△ C137, 138	199113101	6800μF, ±20%, 50V, ELEC
△ C139	1998104011	10000pF, ±5% 250V (I, IB, BB)
	199810107	10000PF. ±5% 250V (USA)
	159910145	100PF. ±5% 100V (I, IB, BB)
	188610145	100PF. ±5% 50V (USA)
	175610495	100000pF, ±80%, -20% 50V (I, IB, BB)
C143, 144, 145, 146, 149, 150	159915145	150PF. ±5%, 100V (I, IB, BB)
C127, 128, 101, 102, 147, 148	188605015	5pF, ±5%, 50V
C113, 114	159968045	680PF. ±5% 100V (I, IB, BB)
C105, 106	188668045	680PF. ±5% 50V (USA)

REF. No	Part No.	Description
C123, 124, 125, 126	150610445	100000pF, 5% 50V
C121, 122	150668345	47000pF, 5% 50V
TRANSISTORS		
△ Q125, 126	240310321	KTD718-0
△ Q127, 128	240110811	KT8688-0
Q115, 116	2402116411	25C37875
Q113, 114	2400117411	25A14775
Q119, 120	240217321	KTC4370Y
Q121, 122	240015121	KTA1659Y
△ Q130	240310621	KTD1351Y
△ Q129	240110321	KT8988Y
Q117, 118, 133, 138	240211135	KTC3198GR
Q101, 102, 105, 106, 134	240011835	KTC1266GR
Q109, 110, 111, 112, 123, 124, 137	240011825	KTC3200BL
Q103, 104, 106, 107, 135, 136	240011425	KTC1268BL
F.E.T		
Q131, 132	2404118151	25K373
DIODES		
△ D107	2413091671	PBL403
△ D106	2413581651	1N403L
D101, 102	241017995	1SS133
△ D103, 104	242113035	ZENER, 1N964, 13V
△ D105	242106245	ZENER, 1N753, 6.2V
COILS		
L101, 102	212930501	0.7μH
MISCELLANEOUS		
P0101	2505121011	POSISTOR
S101	220237301	PUSH SWITCH
SPEAKER TERMINAL	215577701	
INPUT JACK	215561801	
WA104	216813401	WAFER 3P
WA103, 105	216812201	WAFER 3P
WA101, 102	216812301	WAFER 4P
LUG	289960701	EARTH WIRE
PCB-2 CONTROL P.C. BOARD		
CONTROLS		
VR201	250122021	250KΩ, MN
VR202, 203	250121901	100KΩ, 20C
RESISTORS		
R249, 250, 207, 208	111810425	100KΩ, 1/8W, ±5%
R251, 252	111810325	10KΩ, 1/8W, ±5%
R217, 218, 221, 222	111810225	1KΩ, 1/8W, ±5%
R219, 220, 239, 240	111810125	100 Ω, 1/8W, ±5%
R201, 202	111812225	1.2KΩ, 1/8W, ±5%
R215, 216, 207, 208	111815425	150KΩ, 1/8W, ±5%
R209, 210	111815325	15KΩ, 1/8W, ±5%
R237, 238	111822425	220KΩ, 1/8W, ±5%
R231, 232	111822225	2.2KΩ, 1/8W, ±5%
R229, 230	111822125	220 Ω, 1/8W, ±5%
R211, 212	111827125	2.7KΩ, 1/8W, ±5%
R223, 224	111827425	270KΩ, 1/8W, ±5%
R213, 214, 225, 226, 245, 248	111833125	330 Ω, 1/8W, ±5%
R203, 204	111839125	390 Ω, 1/8W, ±5%
R205, 206, 235, 236	111847325	47KΩ, 1/8W, ±5%
R243, 244, 246, 247	111847925	4.7 Ω, 1/8W, ±5%
R241, 242	111856225	5.6KΩ, 1/8W, ±5%
R227, 228	111882025	82 Ω, 1/8W, ±5%
R233, 234	111833025	33 Ω, 1/8W, ±5%

REF. No**Part No.****Description****CAPACITORS**

C219, 220	141610865	0.1 μ F, \pm 20%, 50V ELEC
C205, 206	141622965	2.2 μ F, \pm 20%, 50V ELEC
C211, 212, 213, 214	141322065	22 μ F, \pm 20%, 16V ELEC
C223, 224	141647865	0.47 μ F, \pm 20%, 50V ELEC
C217, 218, 226, 227	141347065	47 μ F, \pm 20%, 16V ELEC
C210, 209	150615441	150000pF, \pm 5%, 50V
C207, 208	150627345	27000pF, \pm 5%, 50V
C201, 202	150636345	36000pF, \pm 5%, 50V
C221, 222	150647345	47000pF, \pm 5%, 50V
C203, 204	150668245	6800pF, \pm 5%, 50V
C215, 216	188633045	33pF, \pm 5%, 50V
C228, 229	188610045	10pF, \pm 5%, 50V

TRANSISTORS

Q201, Q202	240211135	KTC3198GR
Q203, 204, 205, 206	240011835	KTA1266GR
Q211, 212	240211825	KTC3200BL
Q209, 210	240011425	KTC1268BL

F.E.T

Q207, 208	2404111351	2SK246GR
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MISCELLANEOUS

S201	220219801	PUSH SWITCH
CW103	215988902	CONNECTOR ASS'Y 3P
CW101	215979001	CONNECTOR ASS'Y 4P
CW102	215989202	CONNECTOR ASS'Y 4

PCB-3 POWER RELAY P.C. BOARD**RESISTOR**

R304	1114110023	10 Ω , 1W
R303	111815225	1.5K Ω , 1/8W, \pm 5%
R301	111847225	4.7K Ω , 1/8W, \pm 5%

CAPACITOR

C301	141901065	1 μ F, 20%, 100V, ELEC
C302	1998104011	10000pF, \pm 5%, 250V (LIB.BB)
	199810107	10000pF, \pm 5%, 250V (USA)

TRANSISTORS

Q301, 302	240211135	KTC3198GR
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DIODE

D301	241017995	1SS133
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RELAY

Δ RY301	214022502	JW1AFSN-DC12V
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MISCELLANEOUS

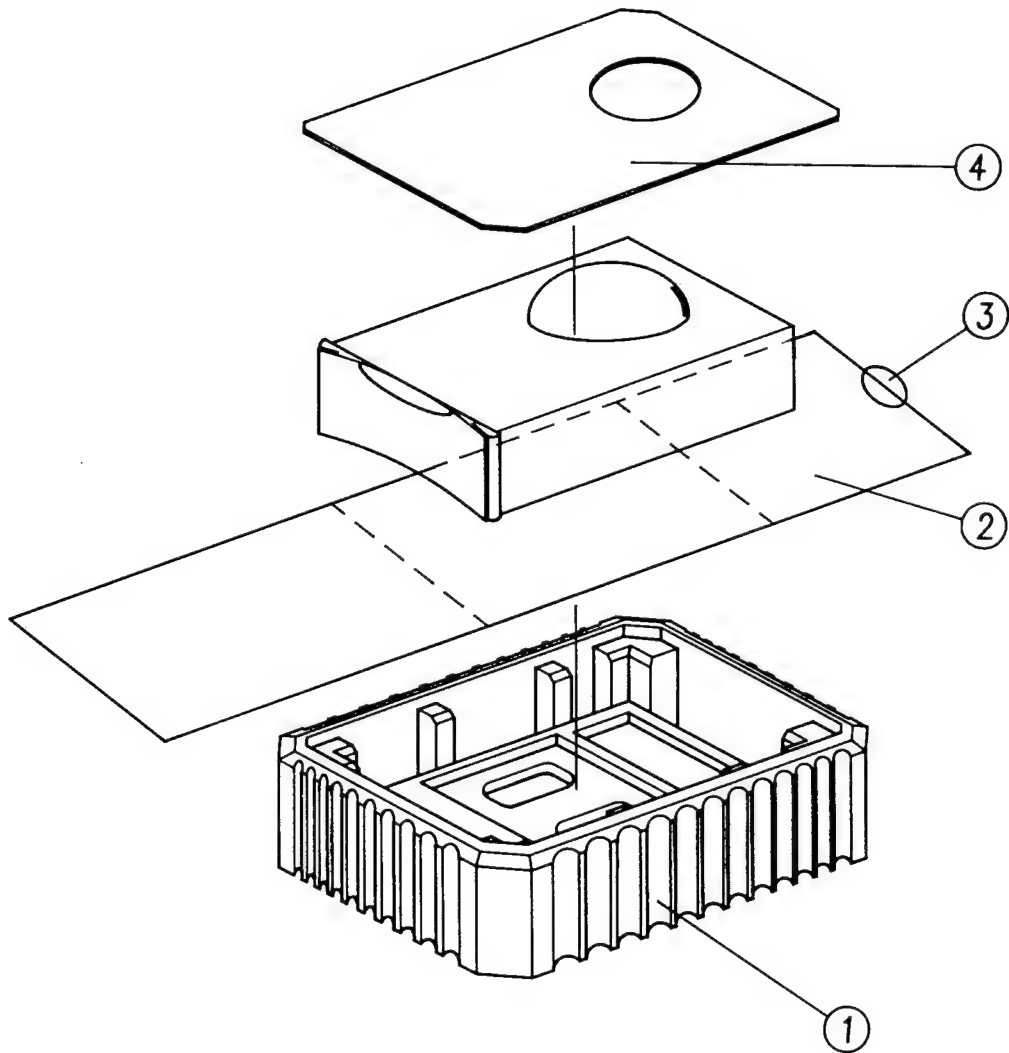
Δ S301	219017901	SLIDE SWITCH
CW104	215998201	CONNECTOR ASS'Y 3P

PCB-4 HEADPHONES P.C. BOARD

PHONES JACK	215565001	3P MINI JACK
CW105	215964301	CONNECTOR ASS'Y 3P

PACKING DRAWING

Amplifier : A-300

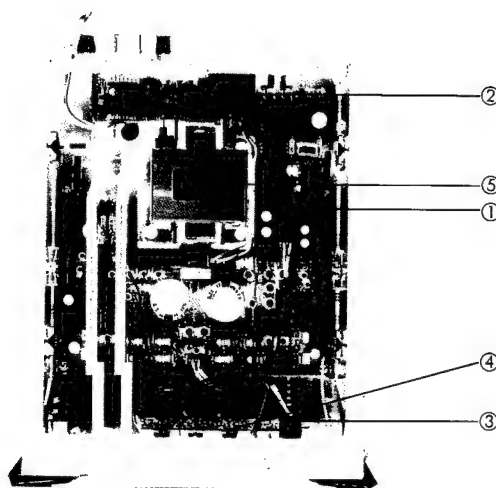


NO	PARTS NAME	PARTS NO.	Q'TY
1	PAD BOTTOM	3-127-916-01	1
2	SHEET POLY	3-324-029-01	1
3	STICKER SET	3-819-817-01	1
4	INNER LID	3-324-019-01	1

3 HK-A500

INTERNAL VIEW

TOP VIEW



- ① PCB-1 Main p.c.board
- ② PCB-2 power Transformer p.c.board
- ③ PCB-3 Control p.c.board
- ④ PCB-4 Control p.c.board
- ⑤ Power transformer

DISASSEMBLY PROCEDURES

1 TOP Cover Removal

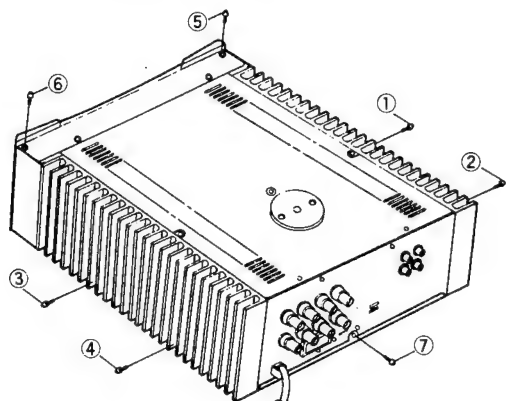


Fig. 1

1. Remove screws ① to ⑦ in Fig. 1
2. Remove the top cover

2 Bottom Cover Removal

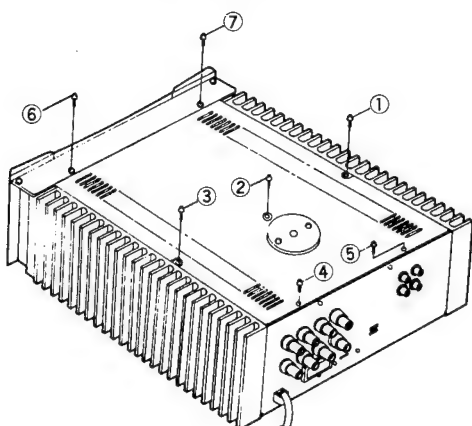


Fig. 2

1. Remove screws ① to ⑦ in Fig. 2, and then remove the bottom cover.

3 Rear Panel Removal

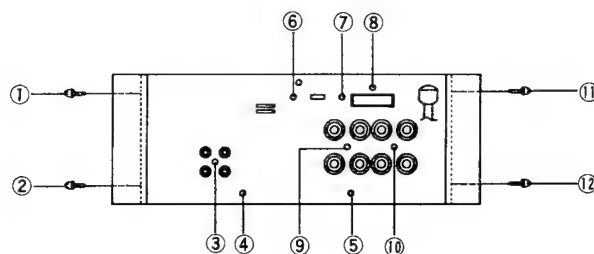


Fig. 3

1. Remove screws ① to ⑫ in Fig. 3, and then remove the rear panel

4 PCB-⑤ (Power Trans Former PCB) Removal

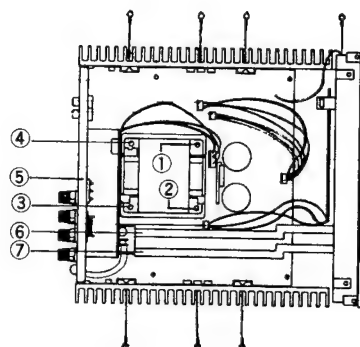


Fig. 4

1. Remove the rear panel in Fig.3 (Refer to step 3)
2. Remove screws ① to ④ in Fig. 4, and then remove the pcb-2 ⑤ with the power transformer
3. Remove switch rods ⑥ to ⑦ and speaker selector switch in Fig. 4

5 PCB-18 (Main PCB) Removal

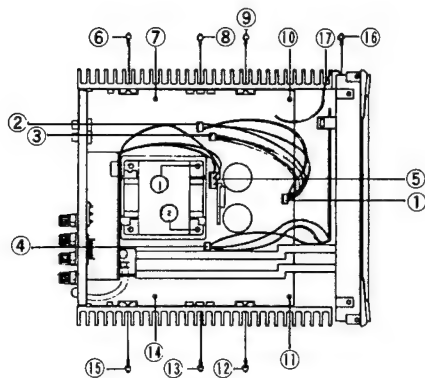


Fig. 5

1. Remove the pcb-2 and power trans (Refer to step 4).
2. Remove connectors ① to ⑤ in Fig. 5, and then remove screws ⑥ to ⑬
3. Remove screw ⑭ in Fig. 5, and then untie the ground wire ⑰
4. Remove the pcb-18 Fig. 5

7 PCB-2, 7 (Control PCB) Removal.

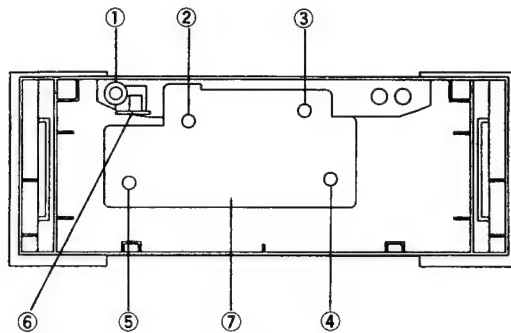


Fig. 7

1. Remove the front panel assembly (Refer to step 6)
2. Remove screw ①, in Fig. 7, and then remove pcb-3 ⑥
3. Remove screws ② to ⑤, in Fig. 7, and then remove pcb-4 ⑦

6 Front Panel Assembly Removal

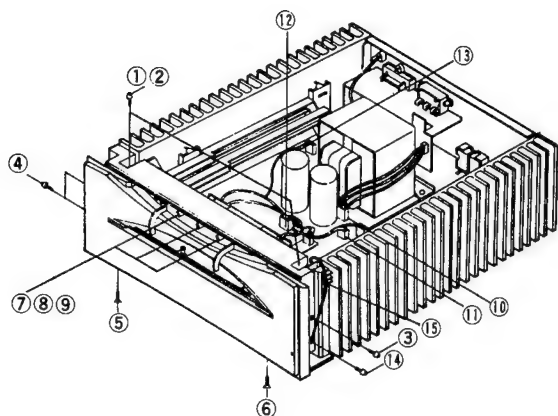


Fig. 6

1. Remove the rotary knobs ⑦ to ⑨ in Fig. 6
2. Remove connectors ⑩ to ⑬ in Fig. 6
3. Remove screw ⑭ and then unite the ground wire ⑰ in Fig. 6
4. Remove screws ① to ⑥ in Fig. 6, and then remove the front panel assembly by pulling it toward you gently.

ALIGNMENT PROCEDURES

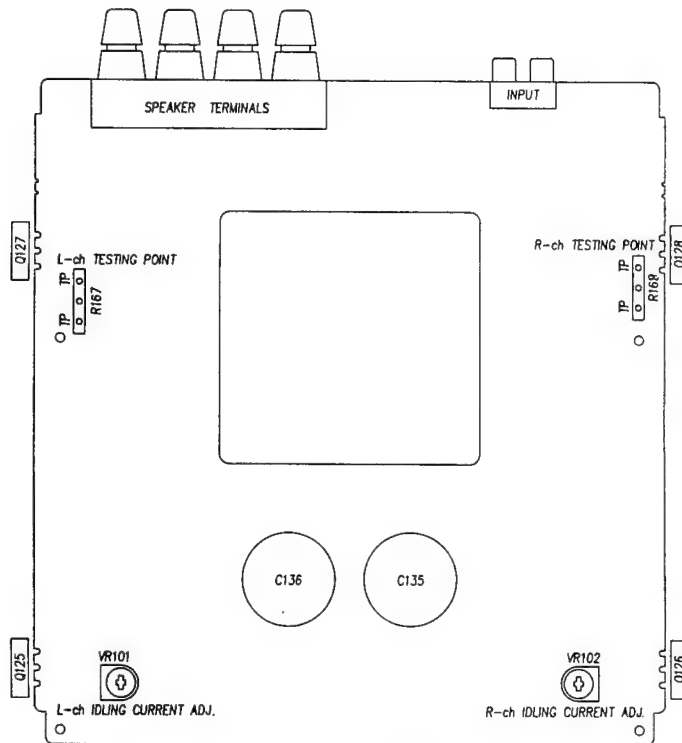
Amplifier : A500

- Conditions:
- Set the Volume control of Tuner to minimum.
 - Set the Speaker switches to "off" position.
 - Make the adjustment at a room temperature of 77°F (25°C).
 - After the Power Switch of Tuner is pushed on, Wait for 60 minutes before measuring to be sure of the most stable operation.

- △ NOTE:
- Power amplifier can be serviced without TUNER by shorting Points PIN No. AC2 and JUMPER WIRE No. J93
 - DC OFFSET VOLTAGE should be less then 100mV after POWER ON 12sec.

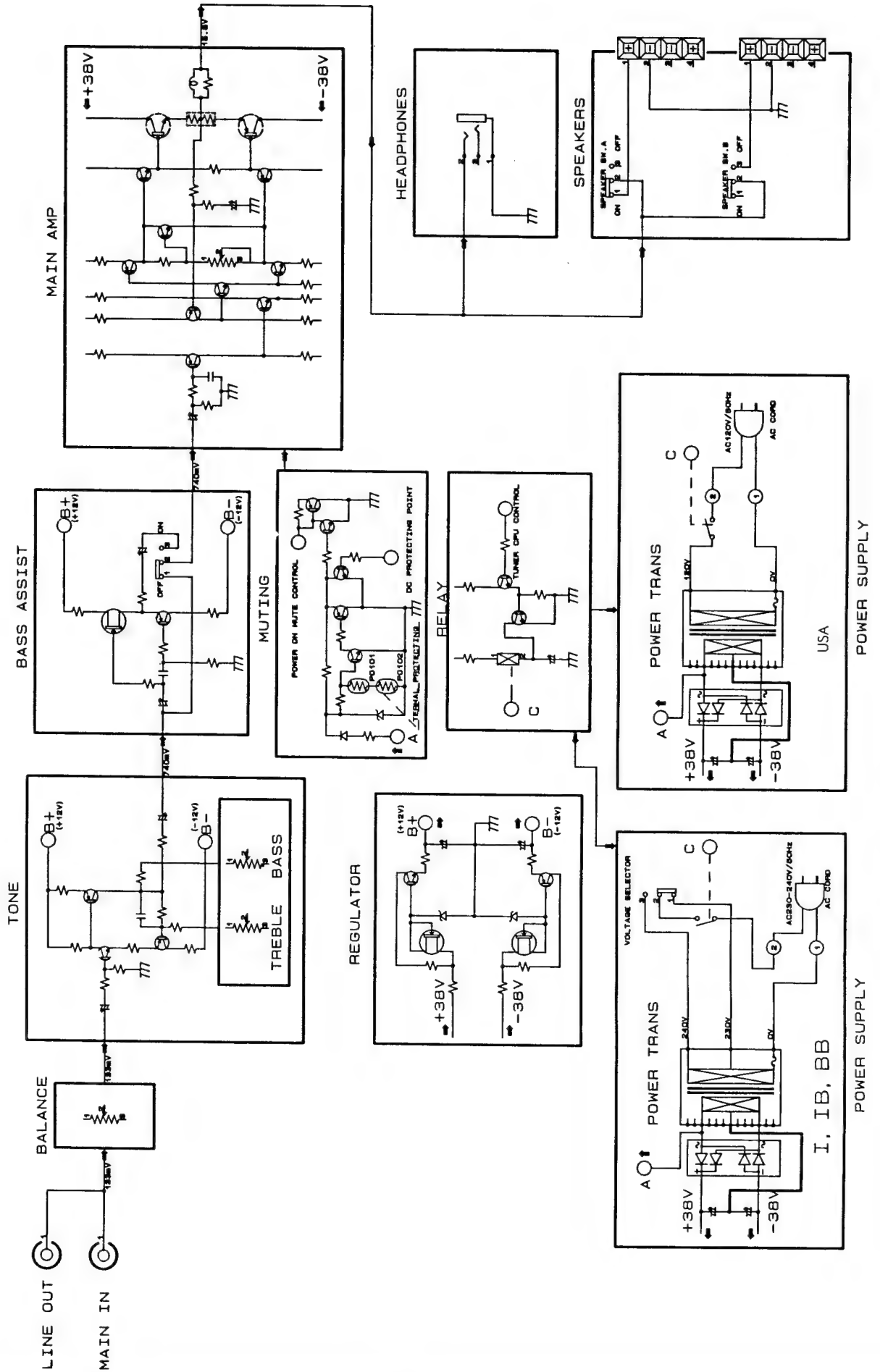
■ IDLING CURRENT ADJUSTMENT

STEP	Connection Equipments	Adjustment	FOR
1	Connect the Digital Volt Meter to both side of R167	VR101(L-ch)	26mV±2mV
2	Connect the Digital Volt Meter to both side of R168	VR102(R-ch)	26mV±2mV



A 500 Adjustment point

A-500 AMPLIFIER BLOCK DIAGRAM



CIRCUIT DESCRIPTION

Amplifier : A-500

■ TONE CONTROLS.

Fig 1 shows the basic tone control circuit. The tone amplifier is a DC-coupled amplifier

The tone circuit constitutes INPUT small signal Transistor (Q201) OUTPUT small signal Transistor (Q205) and CONSTANT current Transistor (Q203). Tone control (Bass, Treble) is accomplished by providing the tone amplifier NFB circuit with a frequency selective characteristic. (Bass:50Hz, Treble:10kHz)

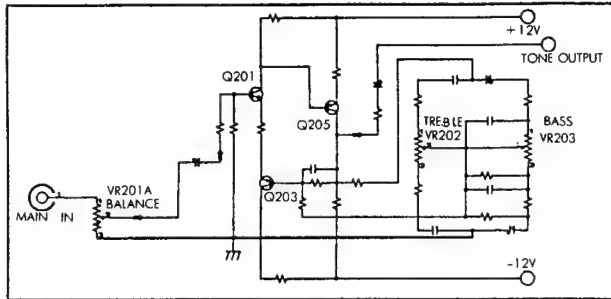


Fig. 1

■ POWER AMPLIFIER SECTION

The basic circuit arrangement of the power amplifier is shown in Fig 3. The first stage is a differential amplifier comprising PNP two transistors (Q103, Q107).

The pre-drive stage consists of ultra low capacitance transistors (Q113, Q115).

The power stage bias voltage is supplied by the transistor (Q117).

The power stage consists of drive transistors (Q119, Q121) and power transistors (Q125, Q127).

■ BASS ASSIST

Fig 2 shows the BASS ASSIST circuit.

The BASS ASSIST circuit consists of CONSTANT current F. E. T (Q207) and small signal transistors (Q209, Q211).

This circuit is active low cut filter. (Accent frequency is 55Hz).

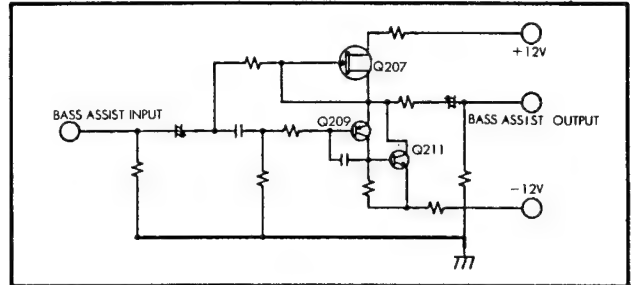


Fig. 2

The power amplifier has a over-output current protection circuit. If current exceeding the specification flows through Q125 & Q127(L-ch), Q123 & Q135 Will conduct. As result Q133 will switch OFF, and the mute line will go low(MUTE). The thermal protection circuit consists of Transistors (Q134, Q138) and posistors (PO 101, PO 102). When heat sink temperature exceeds 80°C, Q136 & Q134 switch ON and the MUTE line goes low(MUTE).

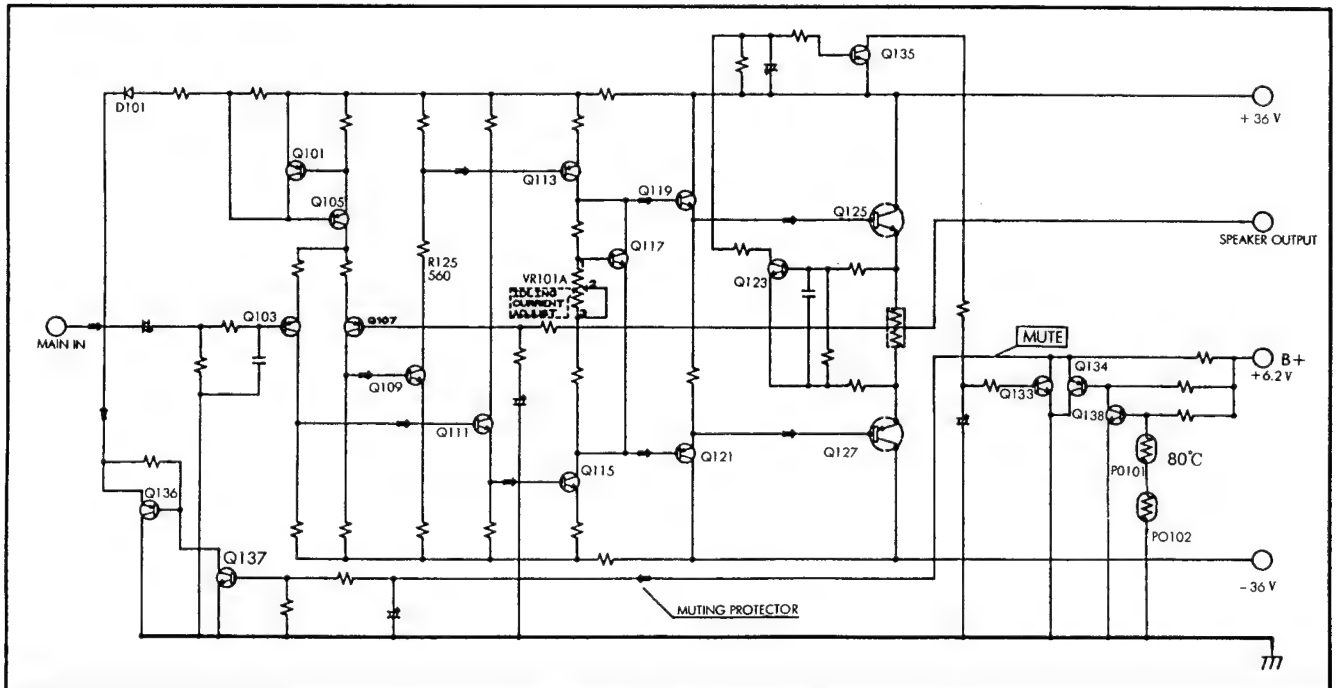
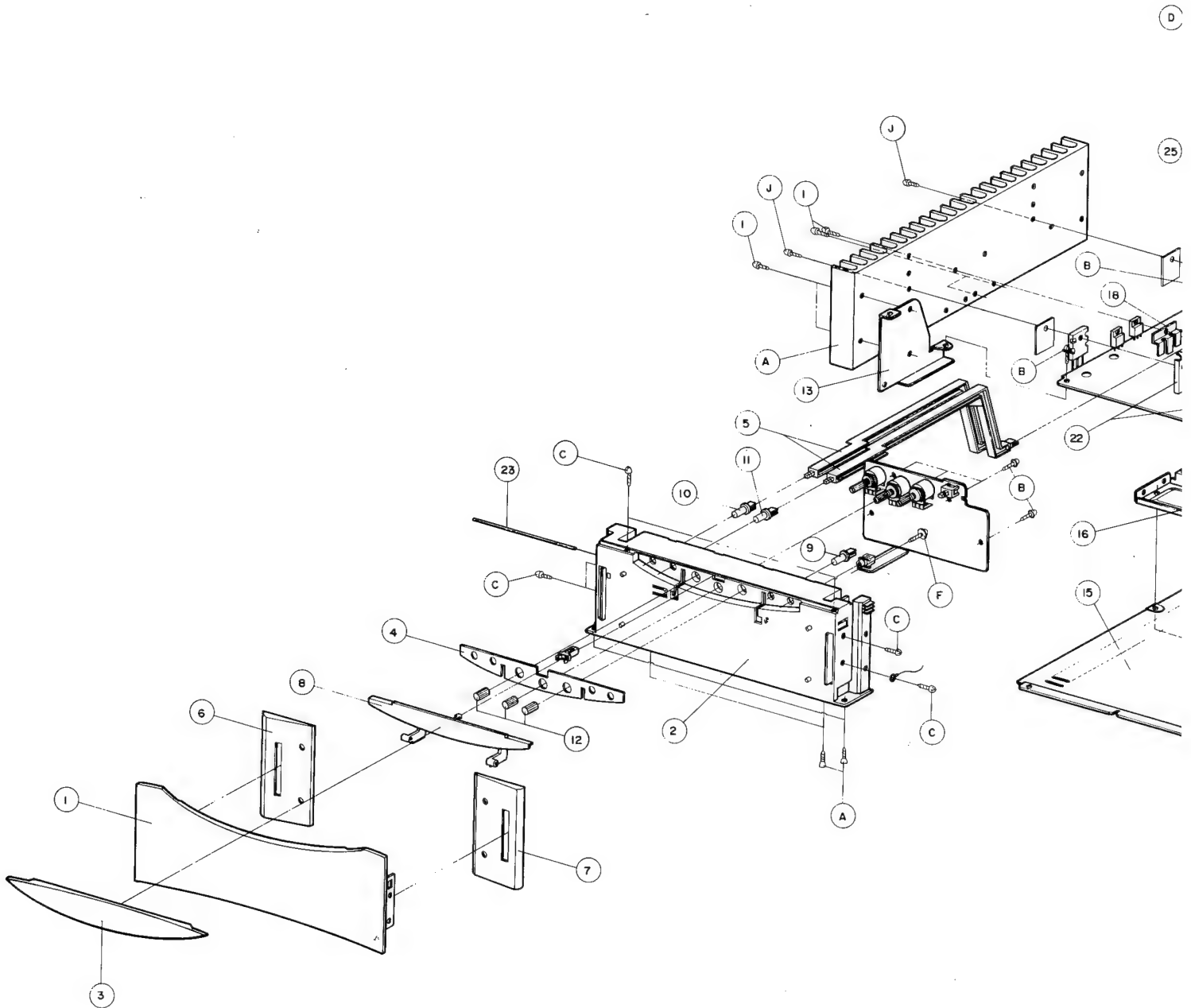
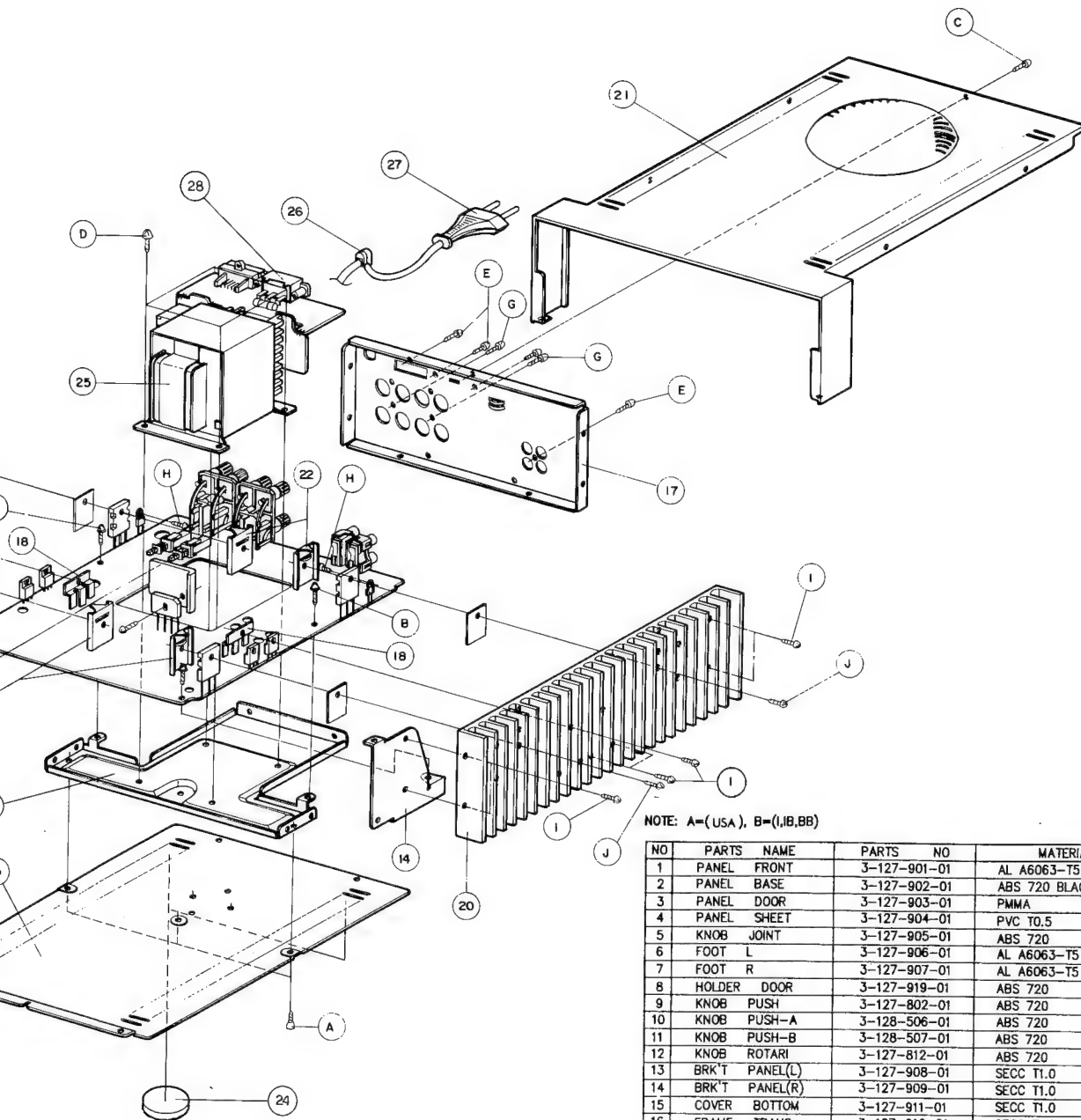


Fig. 3

EXPLODED VIEW

Amplifier : A 500





NOTE: A=(USA), B=(I,B,BB)

NO	PARTS NAME	PARTS NO	MATERIAL	Q'TY	REMARK
1	PANEL FRONT	3-127-901-01	AL A6063-T5	1	A,B
2	PANEL BASE	3-127-902-01	ABS 720 BLACK	1	A,B
3	PANEL DOOR	3-127-903-01	PMMA	1	A,B
4	PANEL SHEET	3-127-904-01	PVC T0.5	1	A,B
5	KNOB JOINT	3-127-905-01	ABS 720	2	A,B
6	FOOT L	3-127-906-01	AL A6063-T5	1	A,B
7	FOOT R	3-127-907-01	AL A6063-T5	1	A,B
8	HOLDER DOOR	3-127-919-01	ABS 720	1	A,B
9	KNOB PUSH	3-127-802-01	ABS 720	1	A,B
10	KNOB PUSH-A	3-128-506-01	ABS 720	1	A,B
11	KNOB PUSH-B	3-128-507-01	ABS 720	1	A,B
12	KNOB ROTARI	3-127-812-01	ABS 720	3	A,B
13	BRK'T PANEL(L)	3-127-908-01	SECC T1.0	1	A,B
14	BRK'T PANEL(R)	3-127-909-01	SECC T1.0	1	A,B
15	COVER BOTTOM	3-127-911-01	SECC T1.0	1	A,B
16	FRAME TRANS	3-127-910-01	SECC T1.0	1	A,B
17	PANEL REAR	3-128-504-01	SECC T0.8	1	A
17	PANEL REAR	3-127-912-01	SECC T0.8	1	B
18	BRK'T TR-A	3-127-913-01	P.B T0.6	2	A,B
19	HEAT SINK(L)	3-127-914-01	AL A6063-T5	1	A,B
20	HEAT SINK(R)	3-128-503-01	AL A6063-T5	1	A,B
21	CASE BONNET	3-127-915-01	SECC T0.8	1	A,B
22	BRK'T TR-B	3-127-918-01	SECC T1.0	4	A,B
23	SHAFT	3-127-921-01	P12X10S	1	A,B
24	FOOT CUSHION	3-127-924-01	SBR BLACK P118XT6.5	1	A,B
25	POWER TRANS	2-131-494-02	120V 60Hz	1	A
25	POWER TRANS	2-131-488-01	230V,240V 50Hz	1	B
26	BUSHION S/RELIEF	8-201-118-01	HEYCO SR-15-1	1	A
26	BUSHION S/RELIEF	8-201-117-01	HEYCO SR-14-1	1	B
27	CORD AC	2-211-124-02	NDG-023-0	1	A
27	CORD AC	2-211-109-02	NDG-009 VDE	1	B
28	SWITCH SLIDE	2-211-124-02	NDG-023-0	1	B
A	SCREW	7-464-408-01	CBZ30P080FZK	13	A,B
B	SCREW	7-344-408-01	ATZ30P080FZK	8	A,B
C	SCREW	7-764-408-01	VBZ30P080FZK	11	A,B
D	SCREW	7-768-408-01	VBZ40P080FZK	4	A,B
E	SCREW	7-764-410-01	VBZ30P100FZK	3	A,B
F	SCREW	7-999-163-01	S30C	1	A,B
G	SCREW	7-999-166-01	PTB30P100FZK	2	A,B
H	SCREW	7-999-168-01	VBZ30P060FNC	2	A,B
I	SCREW	7-999-169-01	VBZ30P080FNC	18	A,B
J	SCREW	7-999-170-01	VBZ30P120FNC+SPRING	4	A,B

ELECTRICAL PARTS LIST

Amplifier A500

REF. No	Part No.	Description
CHASSIS MISCELLANEOUS		
△ P1	221110902	AC LINE CORD (I, IB, BB)
△ T1	221112402	AC LINE CORD (USA)
	213148801	POWER TRANSFORMER (I, IB, BB)
	213149301	POWER TRANSFORMER (USA)
△ FU301	218862501	FUSE T1.6A/250V (I, IB, BB)
	218865501	FUSE F3.5A/125V (USA)
PCB-1 MAIN P.C. BOARD		
RESISTOR		
△ R167, 168	139021401	0.22Ω, 5W+5W
△ R171, 172, 173, 174	114110023	10Ω, 1W, ±5%
△ R401, 402	114168123	680Ω, 1W±5%
△ R179, 180	130447925	4.7Ω, 1/4W, ±5% FUSE
△ R145, 146, 151, 152	130447025	47Ω, 1/4W, ±5% FUSE
△ R177, 178	130433125	330Ω, 1/4W, ±5% FUSE
R184	111810425	100KΩ, 1/8W, ±5%
R188	111410425	100KΩ, 1/4W, ±5%
R111, 112	111410325	10KΩ, 1/4W, ±5%
R101, 102	111810225	1KΩ, 1/8W, ±5%
R163, 164	111410225	1KΩ, 1/4W, ±5%
R115, 116, 117, 118, 135, 136, 139, 140	111415225	1.5KΩ, 1/4W, ±5%
R147, 148, 149, 150	111822325	22KΩ, 1/8W, ±5%
R181	111822225	2.2KΩ, 1/8W, ±5%
R175, 176	111422025	22 Ω, 1/4W, ±5%
R121, 122	111427125	270 Ω, 1/4W, ±5%
R105, 106, 109, 110, 153, 154	111433325	33KΩ, 1/4W, ±5%
R190	111833225	3.3KΩ, 1/8W, ±5%
R107, 108, 159, 160	111433125	330 Ω, 1/4W, ±5%
R141, 142	111439125	390 Ω, 1/4W, ±5%
R193	111839225	3.9KΩ, 1/8W, ±5%
R191	111439225	3.9KΩ, 1/4W, ±5%
R186, 187	111847225	4.7KΩ, 1/8W, ±5%
R157, 158, 189	111447225	4.7KΩ, 1/4W, ±5%
R113, 114, 119, 120, 192	111447125	470 Ω, 1/4W, ±5%
R182	111847325	47KΩ, 1/8W, ±5%
R123, 124, 125, 126, 127, 128, 129, 130, 133, 134	111456125	560Ω, 1/4W, ±5%
R137, 138, 143, 144	111456025	56Ω, 1/4W, ±5%
R183, 185	111868325	68KΩ, 1/8W, ±5%
R155, 156	111882025	82 Ω, 1/8W, ±5%
R161, 162	111491125	910 Ω, 1/4W, ±5%
CONTROLS		
VR101, 102	251247101	470Ω
CAPACITOR		
C146, 147	141601065	1μF, ±20%, 50V, ELEC
C119, 120	141310065	10μF, ±20%, 16V, ELEC
C144, 145	141610065	10μF, ±20%, 50V, ELEC
C148	141210165	100μF, ±20%, 10V, ELEC
C129, 130, 131, 132	141422165	220μF, ±20%, 25V, ELEC
C105, 106	141347065	47μF, ±20%, 16V, ELEC
C123, 124	141447965	4.7μF, ±20%, 25V, ELEC
C113, 114, 115, 116, 133, 134	141647065	47μF, ±20%, 50V, ELEC
C111, 112	141147165	470μF, ±20%, 6.3V, ELEC
△ C135, 136	1991129011	8200μF, ±20%, 63V, ELEC
△ C143	1998104011	10000PF. ±5%, 250V (I, IB, BB)
	199810107	10000PF. ±5%, 250V (USA)
C121, 122	159910145	100PF. ±5%, 100V (I, IB, BB)
	188610145	100pF, ±5%, 50V (USA)
C709, 710	175610495	100000pF, + 80%, -20%, 50V
C701, 702, 705, 706, 707, 708, 721, 722	159915145	150PF. ±5%, 100V (I, IB, BB)
C117, 118	180602015	2pF, ±5%, 50V
C107, 108	159968045	680PF. ±5%, 100V (I, IB, BB)
	188668045	68pF, ±5%, 50V (USA)
C125, 126	150668345	68000pF, 5% 50V
C127, 128	150647345	47000pF, 5% 50V

REF. No	Part No.	Description
TRANSISTORS		
△ Q125, 126	2402167111	2SC3280
△ Q127, 128	2400148111	2SA1301
Q115, 116	2402116411	2SC3787S
Q113, 114	2400117411	2SA1477S
Q119, 120	240217321	KTC4370Y
Q121, 122	240015121	KTA1659Y
△ Q129	240310621	KTD1351Y
△ Q130	240110321	KT8988Y
Q117, 118, 133, 138	240211135	KTC3198GR
Q101, 102, 105, 106, 134	240011835	KTC1266GR
Q109, 110, 111, 112, 123, 124, 137	240011825	KTC3200BL
Q103, 104, 107, 108, 135, 136	240011425	KTA1268BL
F.E.T		
Q131, 132	2404118151	2SK373
DIODES		
△ D107	2413621611	PBU603
△ D106	2413581651	1N4003L
D101, 102	241017995	1SS133
△ D103, 104	242113035	ZENER, 1N964, 13V
△ D105	242106245	ZENER, 1N753, 6.2V
COILS		
L101, 102	212930501	0.7μH
MISCELLANEOUS		
PO101, 102	2505121011	POSISTOR
S101, 102	220237301	PUSH SWITCH
SPEAKER TERMINAL	215577601	
INPUT JACK	215561801	
WA105	216813401	WAFER 3P
WA103, 104	216812201	WAFER 3P
WA101, 102	216812301	WAFER 4P
LUG	289960701	EARTH WIRE
PCB-2 CONTROL P.C. BOARD		
CONTROLS		
VR201	250122021	250KΩ, MN
VR202, 203	250121901	100KΩ, 20C
RESISTORS		
R251, 252	111810425	100KΩ, 1/8W, ±5%
R237, 238	111810325	10KΩ, 1/8W, ±5%
R217, 218, 221, 222	111410225	1KΩ, 1/4W, ±5%
R219, 220, 243, 244	111810125	100Ω, 1/8W, ±5%
R201, 202	111812225	1.2KΩ, 1/8W, ±5%
R215, 216, 207, 208	111815425	150KΩ, 1/8W, ±5%
R209, 210	111815325	15KΩ, 1/8W, ±5%
R239, 240	111822425	220KΩ, 1/8W, ±5%
R231, 232	111822225	2.2KΩ, 1/8W, ±5%
R229, 230	111822125	220Ω, 1/8W, ±5%
R223, 224	111827425	270KΩ, 1/8W, ±5%
R211, 212	111830225	3KΩ, 1/8W, ±5%
R213, 214, 225, 226, 253, 254	111833125	330Ω, 1/8W, ±5%
R233, 234	111833025	33Ω, 1/8W, ±5%
R205, 206, 235, 236	111847325	47KΩ, 1/8W, ±5%
R247, 248, 249, 250	111847925	4.7Ω, 1/4W, ±5%
R245, 246	111856125	560Ω, 1/8W, ±5%
R227, 228	111882025	82Ω, 1/8W, ±5%
CAPACITORS		
C219, 220	141610865	0.1μF, ±20%, 50V ELEC
C205, 206	141622965	2.2μF, ±20%, 50V ELEC

REF. No**Part No.****Description**

C211, 212, 213, 214
C225, 226
C217, 218
C209, 210
C207, 208
C201, 202
C223, 224
C203, 204
C215, 216
C231, 232

141322065
141647865
141347065
150615441
150636345
150630345
150647345
150656245
188633045
188610045

22 μ F, \pm 20%, 16V ELEC
0.47 μ F, \pm 20%, 50V ELEC
47 μ F, \pm 20%, 16V ELEC
150000pF, \pm 5%, 50V
36000pF, \pm 5%, 50V
30000pF, \pm 5%, 50V
47000pF, \pm 5%, 50V
5600pF, \pm 5%, 50V
33pF, \pm 5%, 50V
10pF, \pm 5%, 50V

Q201, Q202
Q203, 204, 205, 206
Q211, 212
Q209, 210

TRANSISTORS

240211135
240011835
240211825
240011425

KTC3198GR
KTA1266GR
KTC3200BL
KTC1268BL

Q207, 208

F.E.T

2404111351

2SK246GR

S201
CW103
CW101
CW102

MISCELLANEOUS

220219801
215988902
215979001
215989202

PUSH SWITCH
CONNECTOR ASS'Y 3P
CONNECTOR ASS'Y 4P
CONNECTOR ASS'Y 4

PCB-3 POWER RELAY P.C. BOARD

Δ R304
R302
R303
R301

RESISTOR

114110023
111410325
111815225
111847225

10 Ω , 1W
10K Ω , 1/4W, \pm 5%
1.5K Ω , 1/8W, \pm 5%
4.7K Ω , 1/8W, \pm 5%

C301
 Δ C302

CAPACITOR

141601065
1998104011
199810107

1 μ F, 20%, 50V, ELEC
10000PF. \pm 5%, 250V (I. IB. BB)
10000PF. \pm 5%, 250V (USA)

Q301, 302

TRANSISTORS

240211135

KTC3198GR

D301

DIODE

241017995

1SS133

Δ RY301

RELAY

2140225021

JW1AFSN-DC12V

Δ S301
CW105

MISCELLANEOUS

219017901
215998201

SLIDE SWITCH (I.IB.BB)
CONNECTOR ASS'Y 3P

PCB-4 HEADPHONES P.C. BOARD

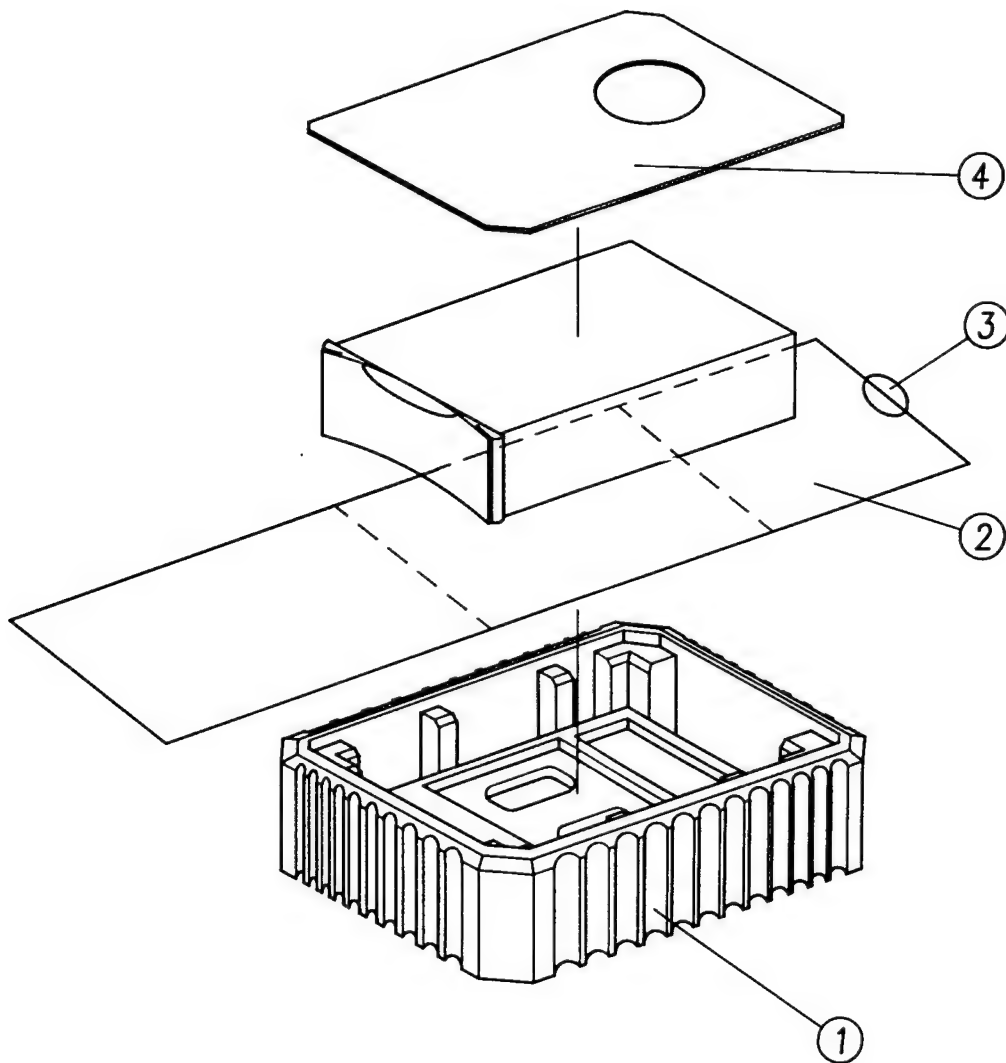
PHONES JACK
CW104

215565001
215964301

3P MINI JACK
CONNECTOR ASS'Y 3P

PACKING DRAWING

Amplifier : A-500



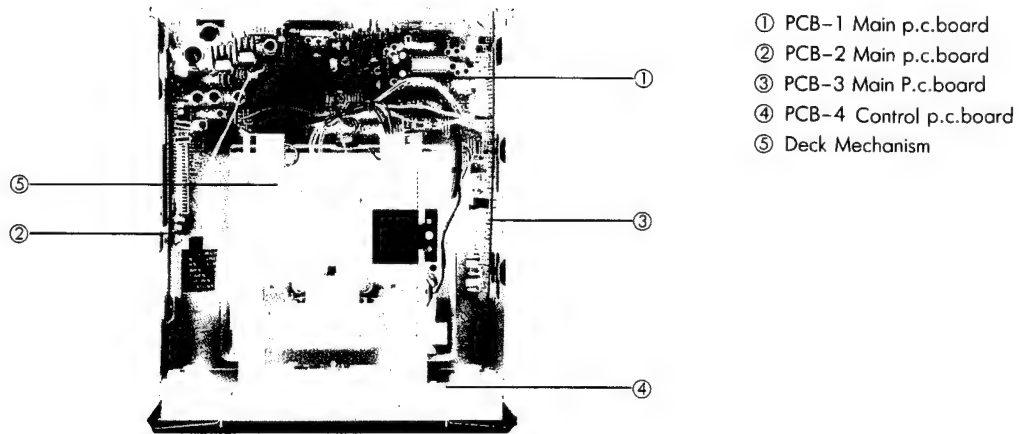
NO	PARTS NAME	PARTS NO.	Q'TY
1	PAD BOTTOM	3-127-916-01	1
2	SHEET POLY	3-324-029-01	1
3	STICKER SET	3-819-817-01	1
4	INNER LID	3-324-019-01	1

TAPE DECK SECTION

5 HK-C300

INTERNAL VIEW

TOP VIEW



DISASSEMBLY PROCEDURES

1 TOP Cover Removal

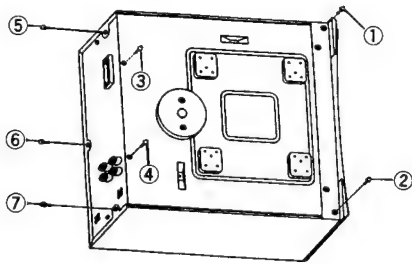


Fig. 1

1. Remove screws ① to ⑦ in Fig. 1
2. Remove the top cover

2 Rear Panel Removal

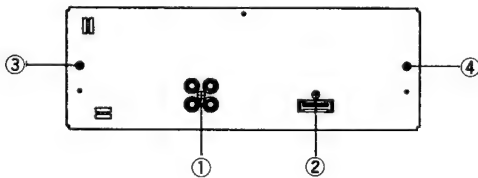


Fig. 2

1. Remove screws ① to ④ in Fig. 2, and then remove the rear panel.

3 PCB-⑮, ⑯, ⑰ (Main PCB) Removal

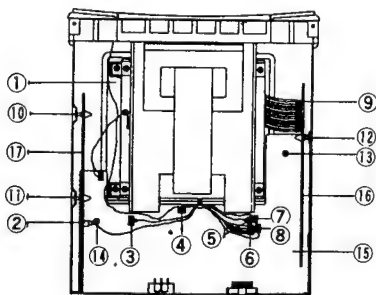


Fig. 3

1. Remove the rear panel in Fig. 2 (Refer to step ②)
2. Remove connectors ① to ⑨, and then remove pcb supports ⑩ to ⑫ in Fig. 3
3. Remove screws ⑬ to ⑮, and then remove the pcb-1 ⑮, pcb-2 ⑯ and pcb-3 ⑰

4 Front Panel Assembly Removal

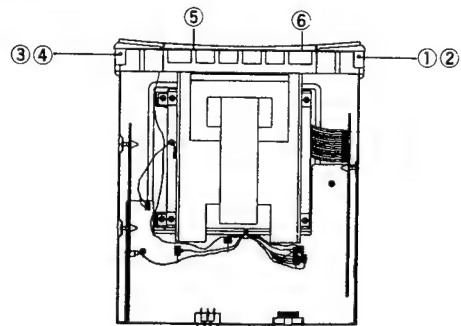


Fig. 4

1. Remove screws ① to ⑥ in Fig. 4
2. Remove the front panel assembly by pulling it toward you gently

5 PCB-⑮ (Control PCB) Removal.

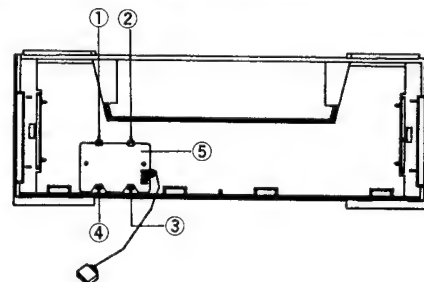


Fig. 5

1. Remove the front panel assembly (Refer to step ④)
2. Pulling hooks ① to ④ in Fig. 5, and then remove the control pcb ⑤

ALIGNMENT PROCEDURES

Tape Deck : C300/ C500

STEP	Alignment	Instrument Required	Input Signal	Mode	Test point	Adjustment	FOR
1	Azimuth	VTVM Oscilloscope Test tape (MTT-114 or TCC-154)		PB	OUTPUT jack	Azimuth screw	Maximum output Refer to "Azimuth Adjustment" on page 62
2	Tape speed	Frequency counter Test tape (MTT-111DN or TCC-112)		PB	OUTPUT jack	VR(built-in motor)	3000Hz \pm 10Hz Adjust at the center of test tape.
3	Playback output level	VTVM Test tape (TCC-130 or MTT-150)		PB	OUTPUT jack	VR101 VR102	365mV-15mV, +40mV
4	Playback frequency characteristic confirmation	VTVM Test tape (TCC-162B and TCC-262B)		PB	OUTPUT jack	R131 ~ R136	Unsolder resistors of R131 and R132, R133 and R134, or R135 and R136 so that the frequency response is within the range as shown in page 62
5	Bias frequency confirmation	Frequency counter		REC/PB	ERASE HEAD	T301	105KHz \pm 3KHz Tape selector is METAL position
6	Dolby HX PRO (HK-C500)	VTVM		REC/PB BIAS TRIM BIAS CENTER		L 501 L 502 VR501 VR502	Maximum output Tape selector is METAL position After adjustment for L501 and L502, set bias fine trim(VR501 and VR502) to the center position. VR301, VR302 is center position.
	At the HK-C300 BIAS CURRENT Adj					VR301 VR302	
7	Record level (pre-adjustment)	VTVM Blank tapes NORMAL:AC-224(TDK) CrO2:XL-II(MAXELL) METAL:MX(MAXELL)	Apply 1KHz signal to INPUT jack. OUTPUT voltage is 365mV in RECORDING mode.	REC / PB	OUTPUT jack	VR201 VR202	365mV Tape selector is CrO2 Position. Adjust VR201 and VR202 so that the distortion becomes 0.8% This confirmation should be at each tape selector position.
8	Record/playback EQ frequency response	VTVM Blank tapes NORMAL:AC-224 CrO2:XL-II METAL:MX	Apply 1kHz signal to INPUT jack. OUTPUT voltage is 20dB below 365 mV in RECORDING mode. Then adjust with a 20Hz to 20 kHz	REC/PB	OUTPUT jack	(HK-C500) VR501 VR502 L 501 L 502 (HK-C300) VR301 VR302	So that the record/playback frequency response is flat (at least within the range in \pm 3dB) This confirmation should be at each tape selector position. Perform checking with Dolby B and C NR ON at each tape selector position.

MECHANICAL ADJUSTMENT

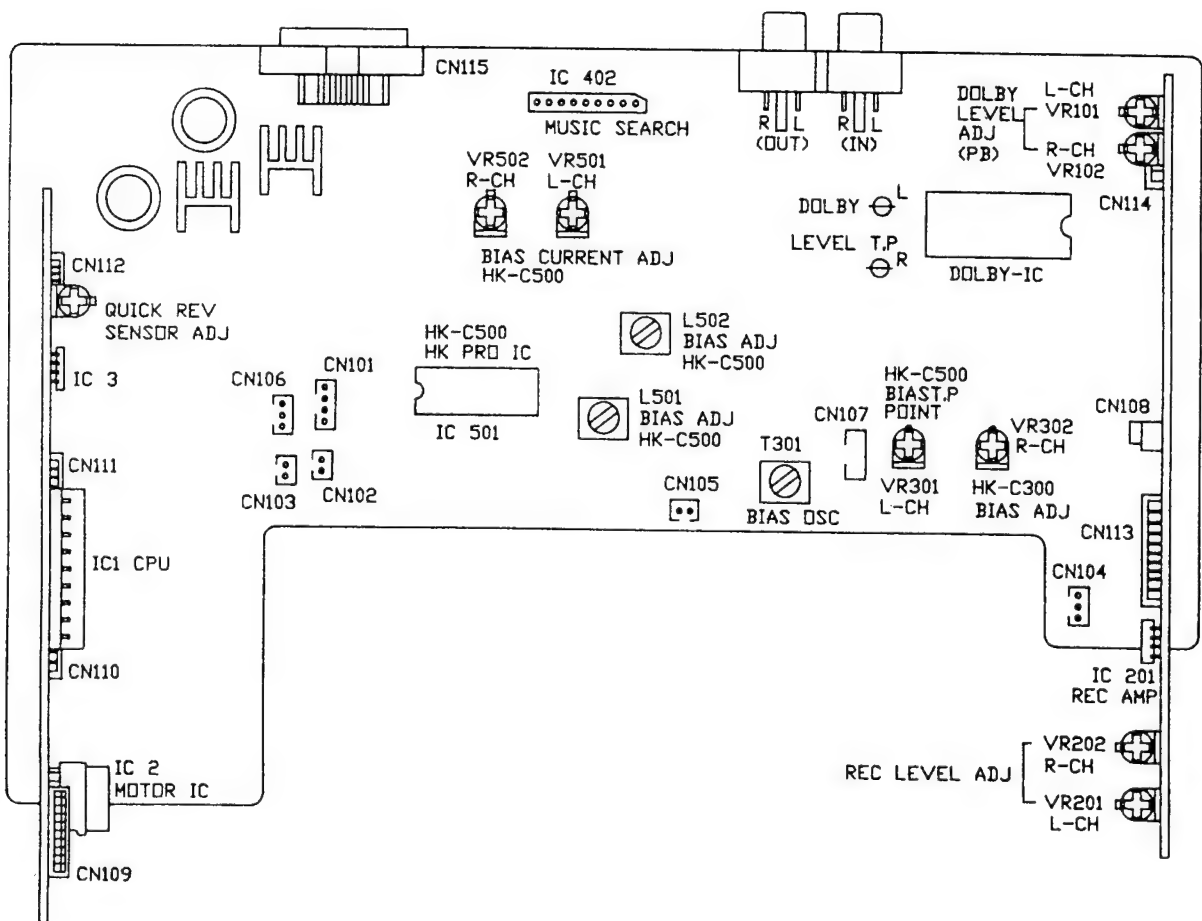
Tape Speed, Azimuth			
Mode	Test tape	Adjustment position	Specification rating(playback frequency)
PLAY	Play TCC-154 tape(12.5 kHz)	Head Azimuth Screw Adj	45 degree (fig. A)

FRONT

REVERSE

speed Adj

FWD Head Azimuth Adjustment
(At the PLAY mode)



C300/C500 : Adjustment point

■ ELECTRICAL ADJUSTMENT AND CONFIRMATION

1. Before adjustment

- After the power switch is pushed on, wait for 10 minutes before measuring to be sure of the most stable operation.
- Since head magnetization, dust accumulations etc are likely to introduce errors in the various characteristics, it is very important that the heads are properly demagnetized and cleaned before commencing any adjustment, particularly frequency response and head azimuth adjustment.

2. Instruments required

- Low frequency oscillator
- AC VTVM or dual channel AC VTVM
- Oscilloscope
- Wow/Flutter meter
- Frequency counter

3. Test tapes

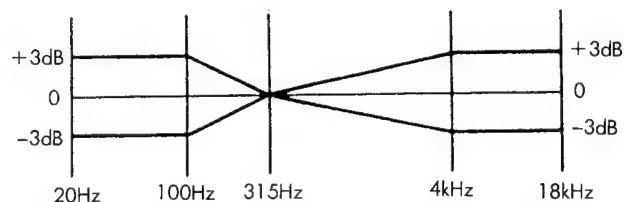
- Azimuth adjustment MTT-114 or TCC-154
- Tape speed adjustment MTT-111 or TCC-112
- Playback output level adjustment TCC-130 (200nWb)
- Playback frequency characteristic confirmation TCC-162B and TCC-262B
- Reference tapes
 LN (TDK) AC-224
 CrO₂-(MAXELL) XL-II
 METAL (MAXELL) MX

Note:

C-90 differs with C-60 in the thickness and bias.
 Adjust with the tape as specified.

PLAYBACK FREQUENCY CHARACTERISTIC

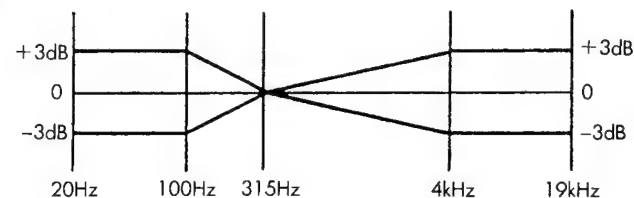
TEST TAPE: TCC-162B, TCC-262B



RECORD/PLAYBACK FREQUENCY CHARACTERISTIC

TEST TAPE: AC-224, XL-II, MX

DOLBY NR: OFF



4. General conditions (unless otherwise noted)

Controls and Switches	Setting
Dolby NR	off

Azimuth Adjustment

When the maximum level point of R channel is not the same as L channel, connect the oscilloscope as shown in Fig A and proceed with azimuth adjustment so that L and R channels are in phase.

- Connect L channel tape out to "X (orH)" and R channel to "Y (orV)". Observe the lissajous waveform.
- Set L and R channels to monaural. Adjust vertical and horizontal gain so that the waveform becomes 45degree.
- Adjust azimuth so that the measurement of "a" becomes maximum and the measurement of "b" becomes minimum against the 45 degree line.
- apply lock tight to head Azimuth Screw

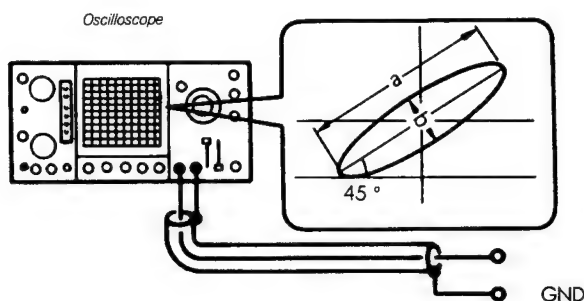
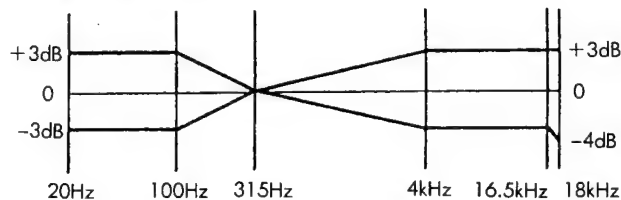


Fig. A

RECORD/PLAYBACK FREQUENCY CHARACTERISTIC

TEST TAPE: AC-224, XL-II, MX

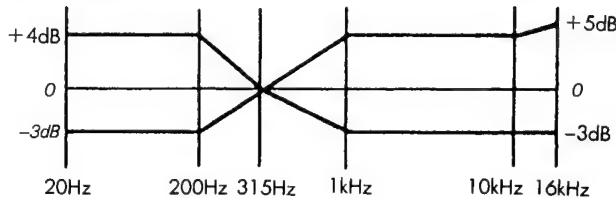
DOLBY NR: TYPE B ON



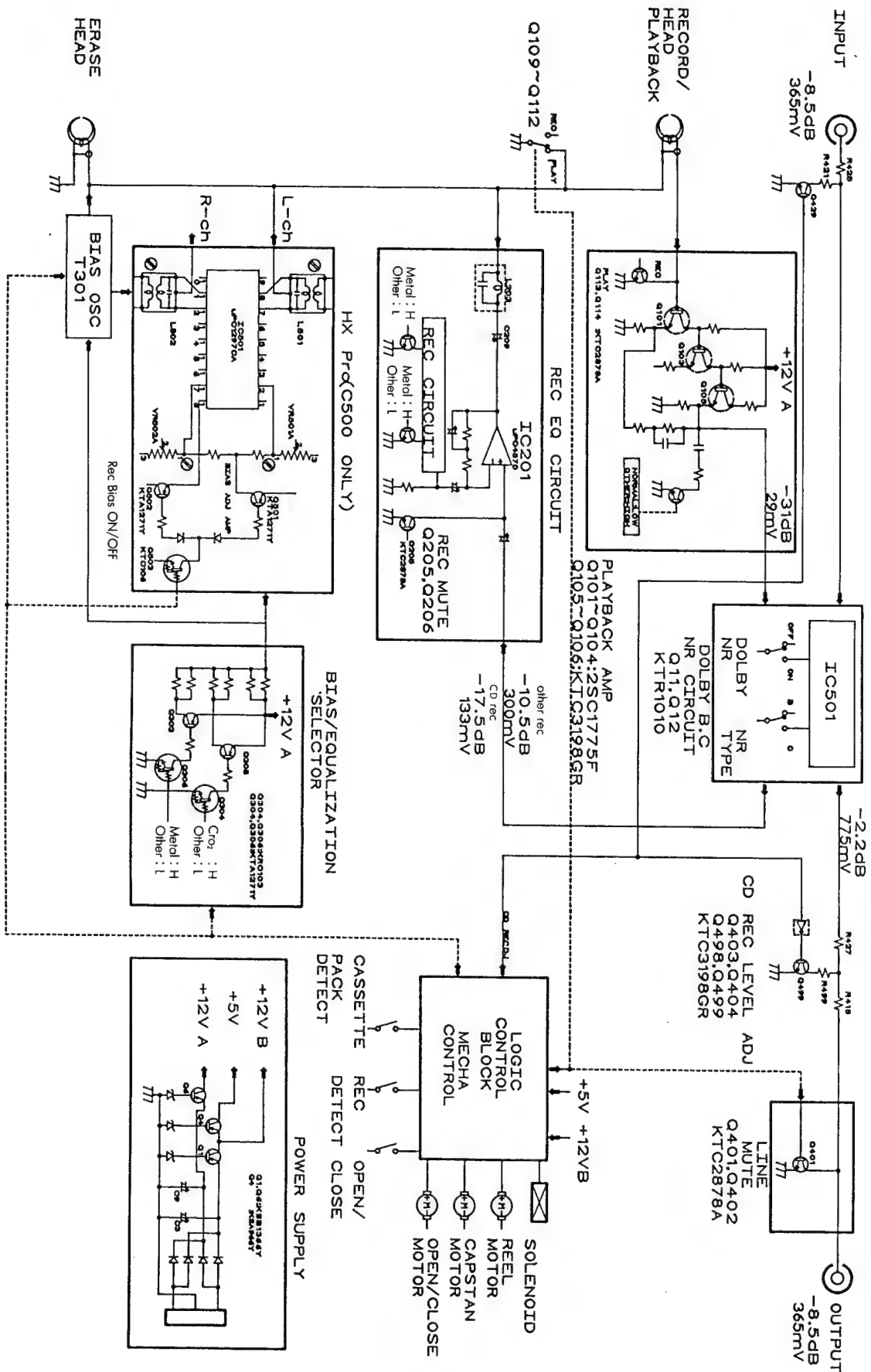
RECORD/PLAYBACK FREQUENCY CHARACTERISTIC

TEST TAPE: AC-224, XL-II, MX

DOLBY NR: TYPE C ON



C-300/500 TAPE DECK BLOCK DIAGRAM



PLAYBACK SIGNAL

The signal from the playback head is amplified by the playback amplifier Q101, Q103 and Q105 (L-ch), and is applied to the pins 3(L-ch) and 28 (R-ch) of the Dolby NR IC401 (B/C type). Switching of the playback signal from the record mode (external input signal) to the playback mode is performed inside IC401.

IC401 is usually switched to the playback mode. However, the control signal transmitted to the pin 26 of IC401 from IC1 through Q13 switches IC401 from the record mode to the play mode. The input signal to IC401 is output from the pins 9(L-ch)and 22(R-ch) and applied to the OUTPUT jack. The characteristics of the playback equalizer are defined by the BIAS/EQUALIZATION switch and are selected and specified in Q119(L-ch) and Q120(R-ch)

RECORD SIGNAL

The signal from the INPUT jack is controlled by the Q429(CD REC level Adj) and is applied to pins 1(L-ch)and 30(R-ch) of the Dolby NR IC401 (B/C type). Switching of the record signal from the playback mode to the record mode is performed inside IC401. The control signal transmitted to the pin26 of IC401 from IC1 through Q13 switches IC401 from the playback mode to the record mode.

The input signal to the Dolby IC is output from pin 15(L-ch) and pin16(R-ch). The signal output from IC401 passes through the record equalizer circuit and is amplified by the record amplifier of IC201. The amplified signal is then applied to the recording head after being synthesized by a bias signal.

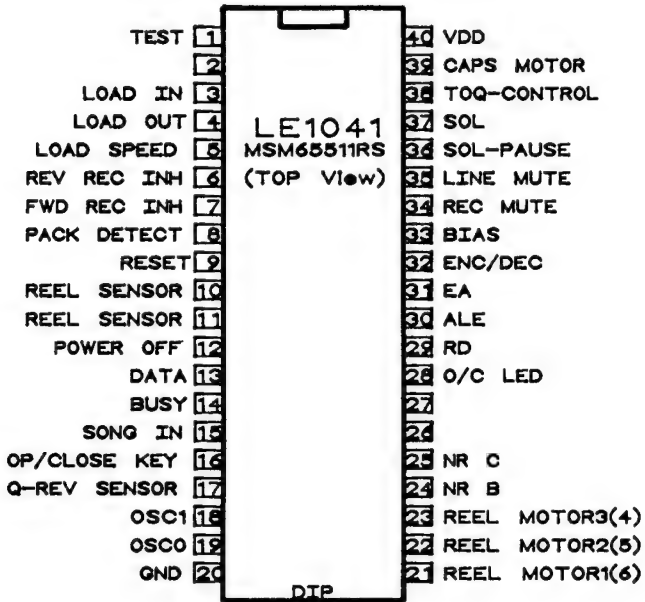
MUTING OPERATION

The signal that mutes the sound produced at switching to recording or playback is applied from IC1 of the logic control block.

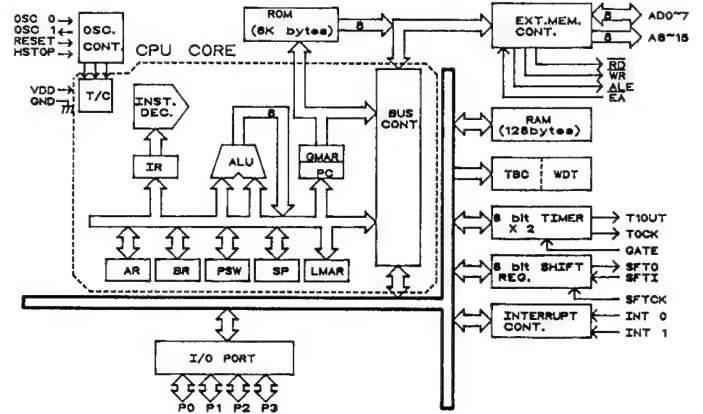
When the "MUTE"button is pressed, the signal output from the pin35 of IC1 turns ON Q401(L-ch) and Q402 (R-ch) to short-circuit the output signals of the playback amplifiers for muting.

IC FUNCTION BLOCK DIAGRAM

IC1 : MICRO COMPATER

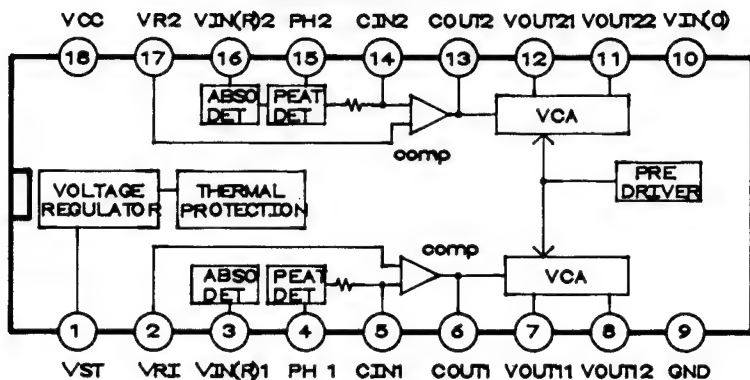


IC1 : CPU CONTROL LE-1041

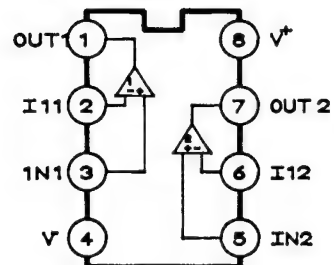


PIN No.	Port name	Function name	I/O	Outline of Functions
3	P3.2	LOAD IN SW	I	LOADING CLOSE = LOW
4	P3.3	LOAD OUT SW	I	LOADING OPEN = HIGH
5	P3.4	LOAD SPEED CONT SW	I	CLOSE PACK SLIDE DOWN = LOW
6	P3.5/SFTO	REV REC INH	I	REV RECORDING INHIBIT TERMINAL
7	P3.6/SFTI	FWD REC INH	I	FWD //
8	P3.7	PACK DETECT	I	TAPE DETECTOR INPUT TERMINAL
9	RESET	RESET		SYSTEM RESET TERMINAL.
10	P2.0	REEL SENSOR	I	SENSING PULSE INPUT TERMINAL
11	P2.1	REEL SENSOR	I	
12	P2.2/INIT0	POWER OFF	I	POWER ON/OFF DETECTION TERMINAL. LOW LEVEL-OFF
13	P2.3/INIT1	DATA	I/O	
14	P2.4	BUSY	I/O	SYSTEM CONTROL SIGNAL I/O TERMINAL
15	P2.5	SONG INPUT	I	INPUT TERMINAL FOR SONG INTERVAL DETECTION.
16	P2.6/WR	OP/CLOSE KEY	I	DOOR OPEN/CLOSE TOGGLE KEY INPUT. LOW ACTIVE
17	P2.7	Q-REV SENSOR	I	TAPE END/START POINT DETECTION
18	OSC1	OSC2		
19	OSC0	OSC1		4MHz RESONATOR CONNECTING TERMINAL.
20	GND	GND		GND TERMINAL.
21	P1.0/A8	REEL MOTOR(6)	O	BA6238A 4PIN CPU 23PIN
22	P1.1/A9	REEL MOTOR(5)	O	BA6238A 5PIN CPU 22PIN
23	P1.2/A10	REEL MOTOR(4)	O	BA6238A 6PIN CPU 21PIN
24	P1.3/A11	NR (DOLBY)	I	
25	P1.4/A12	NR (DOLBY)	I	DOLBY FUNCTION CONTROL.
28	P1.7/A15	O/C LED	O	LOW ACTIVE
32	P0.7/AD7	ENC/DEC	O	PLAY = HIGH REC = LOW
33	P0.6/AD6	BAIS	O	REC = HIGH
34	P0.5/AD5	REC MUTE	O	REC MUTE-LOW
35	P0.4/AD4	LINE MUTE	O	LINE MUTE = HIGH
36	P0.3/AD3	SOL PAUSE	O	LOW VOLTAGE OUTPUT TERMINAL FOR SOLENOID DRIVE.
37	P0.2/AD2	SOLENOID	O	SOLENOID ACTIVE = HIGH
38	P0.1/AD1	TOQ-CONTROL	O	POWER CONTROL HIGH LEVEL = POWER DOWN.
39	P0.0/AD0	CAPSTAN MOTOR	O	OUTPUT TERMINAL FOR CAPSTAN MOTOR DRIVE.
40	VDD	VDD		+5 (POWER SUPPLY TERMINAL)

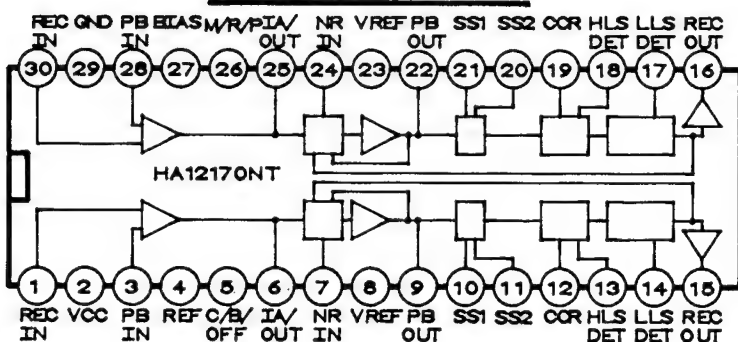
**IC501 : HX PR0
UPC1297CA**



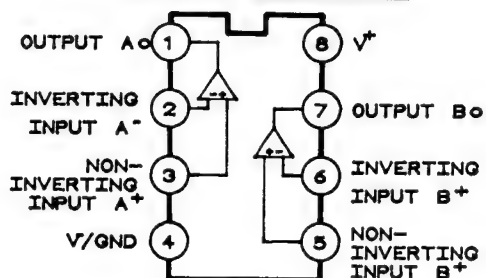
**IC201 : REC EQ
UPC 4570**



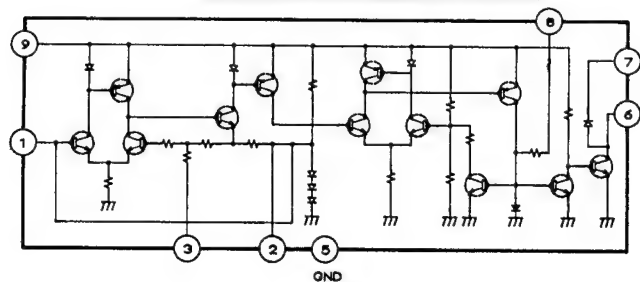
**IC401 : DOLBY B.C NR
HA1217ONT**



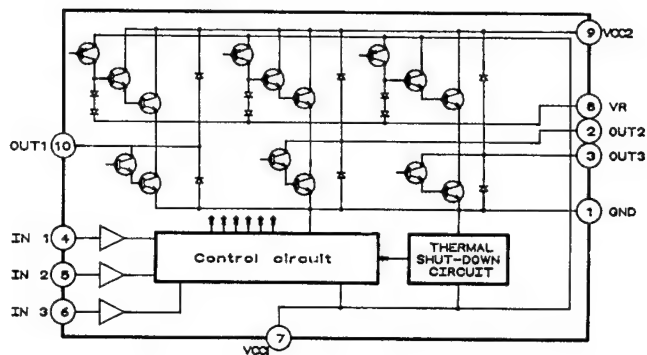
**IC3 : Q-REV SENSOR
BA10393**



**IC402 : MUSIC SEARCH
LA 2000**

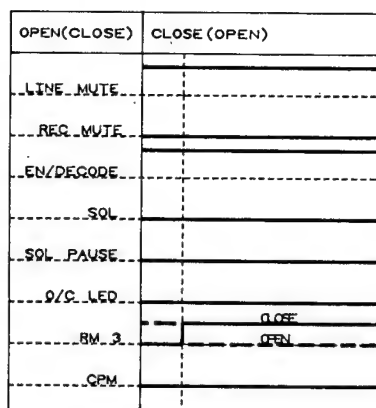
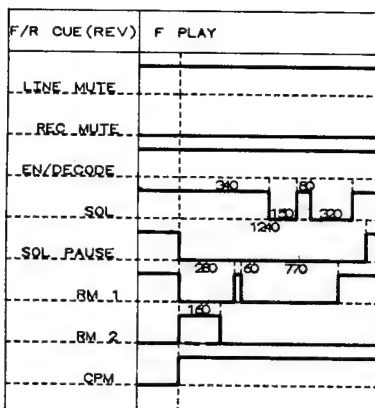
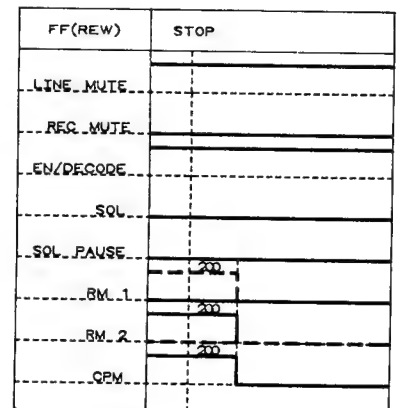
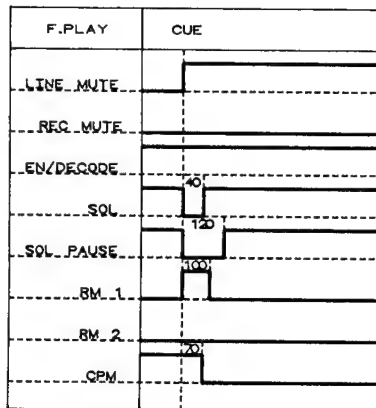
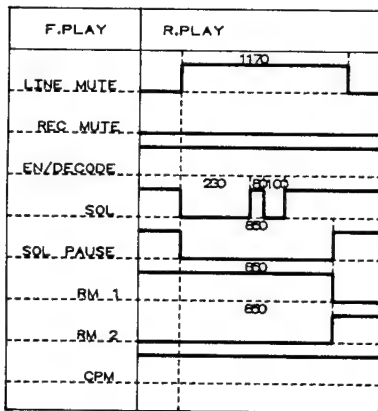
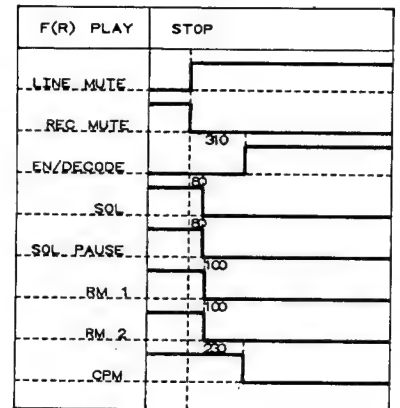
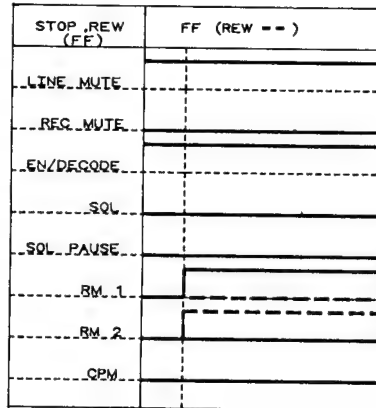
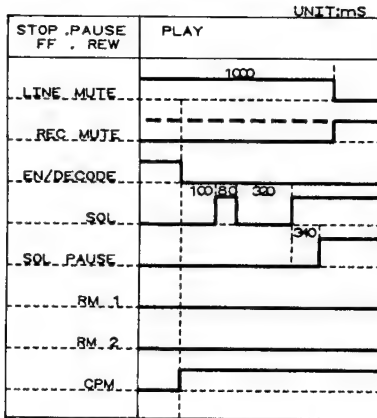


IC2 : MOTOR DRIVER BA6238A



TIMING CHART

Tape Deck : C300/500



TAPE DECK MECHANISM EXPLODE VIEW

PARTS TABLE

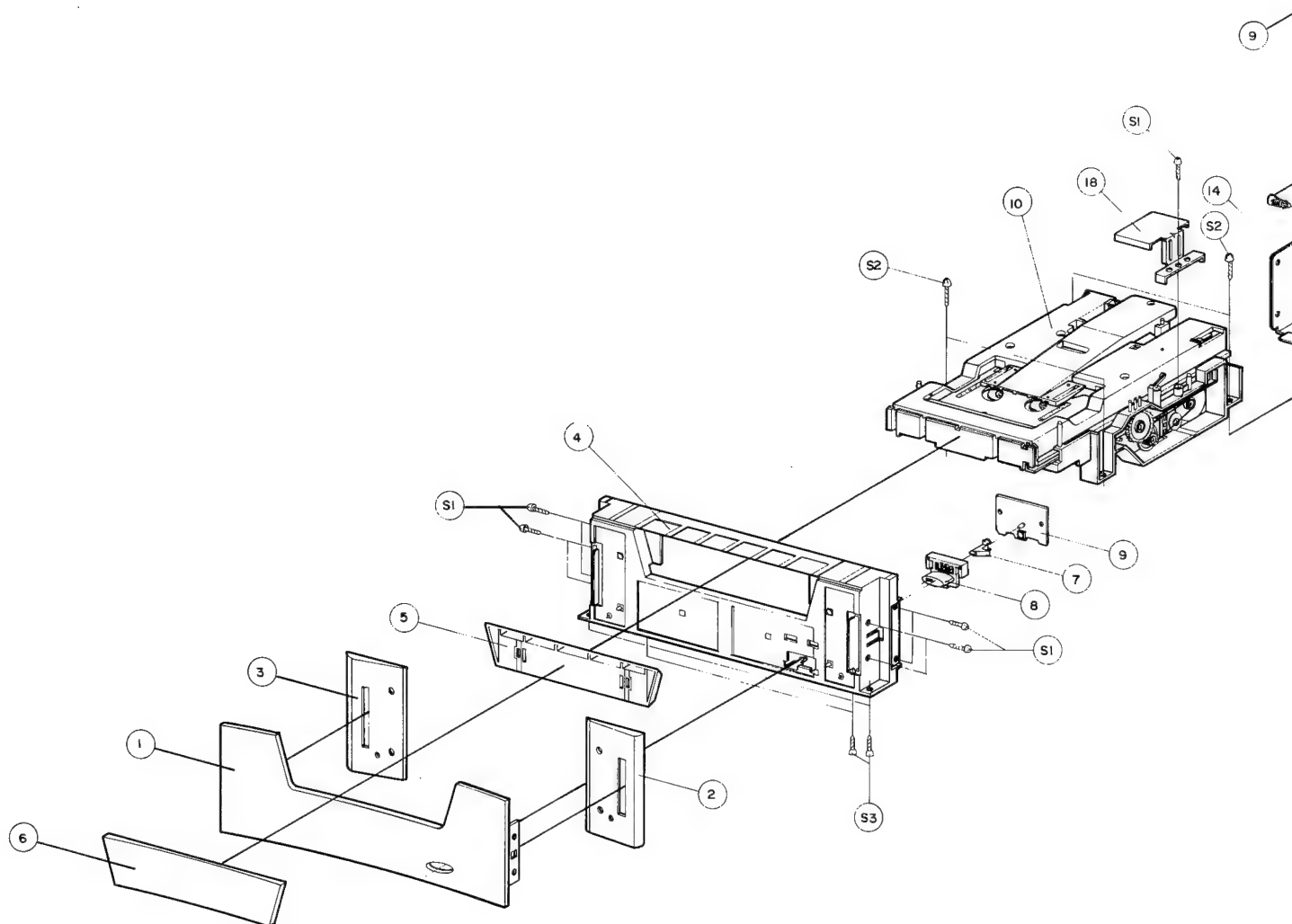
NO.	PARTS NO.	NAME	Q.TY
2	F511-545	CHASSIS BLK	1
2-1	F517-049	IDLER BLK	1
2-2	F564-280	MTL REEL BLK	1
2-3	F612-141	CHASSIS BASE BLK	1
2-4	F623-037	REEL BASE BLK	2
2-5	F615-11A	SCREW 2.6×6.4	2
2-6	FJ111-17	WASHER 1.7×0.25	2
2-7	UJ12V-11	WASHER 2.1×0.25	2
2-8	F513	PLATE MD BLK	1
3	F532E-37	HEAD BASE	1
3-1	F428M-14	HB SP	1
3-2	F428M-14	HB SP	1
3-3	F428M-14	HB SP	1
3-4	F428M-14	HB SP	1
3-5	F428M-14	HB SP	1
3-6	F428M-14	HB SP	1
3-7	F428M-14	HB SP	1
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3-15	F428M-14	HB SP	1
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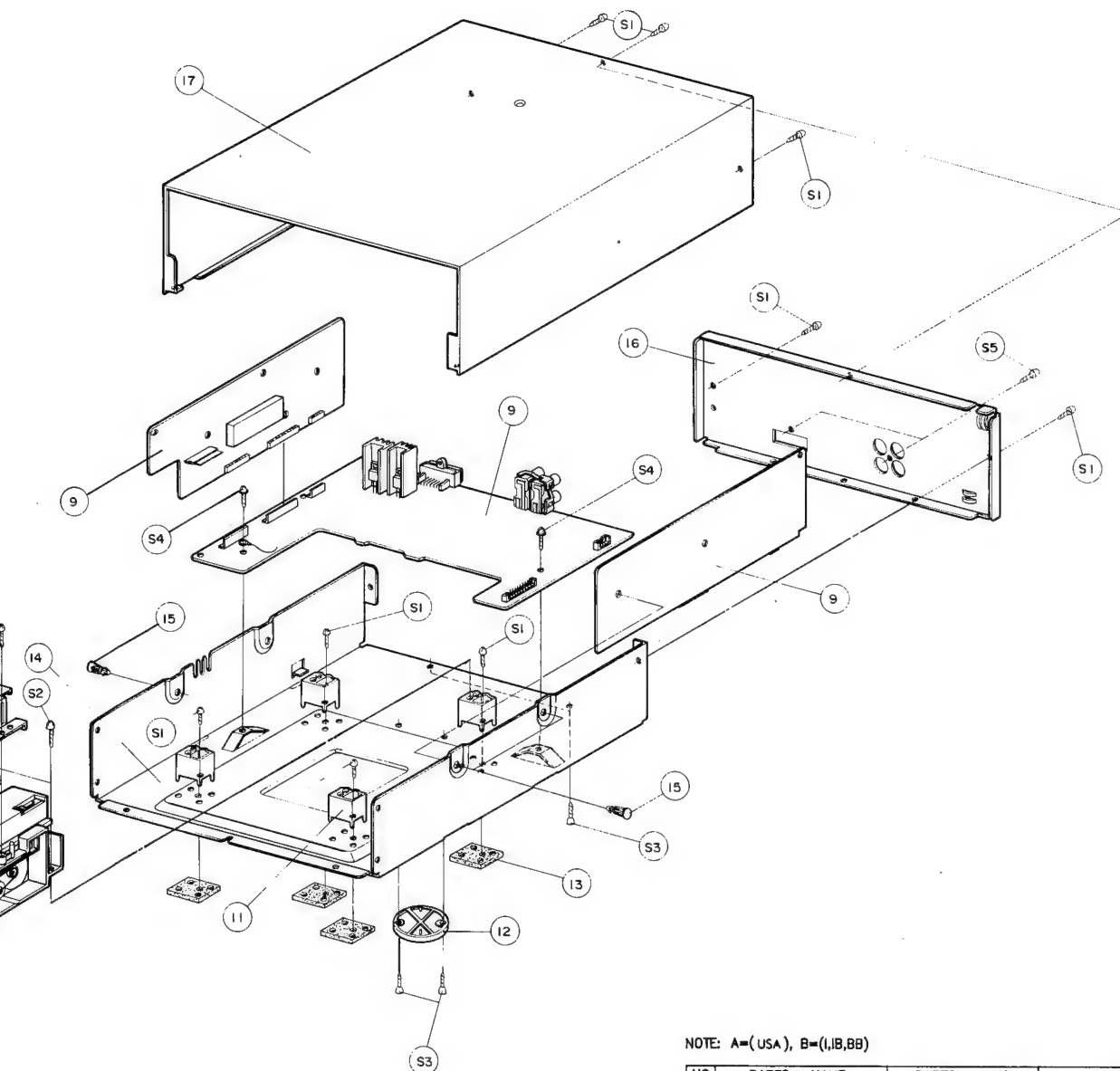
NO.	PARTS NO.	NAME	Q.TY
31	F820L-21A	PINCH ROLLER (R)	1
32	F820M-41	PINCH ROLLER (L)	1
40	UG12M-16	SCREW 3.0×8.2M	1
51	F705-263	SOLENOID BLK	1
52	FL39M-12A	IRON CORE	1
53	FL39M-12	PLUNGER	1
61-1	F533-200	PLATE MOLD BLK	1
61-2	FJ111-16	F/W BKT	2
61-3	FJ123-28	WASHER 1.7×0.25	1
61-5	FJ22M-12	MIDDLE PULLEY	1
61-7	UJ13L-11	SQUARE SPACER	2
63	UG18M-28	SCREW 2.6×4	2
64	UG12M-14	WAVE SCREW 2.6×8	2
65	FF18M-11	MAIN BELT	1
70	UG19C-11	SCREW M2.6×25	1
71	PH12M-11	BAND FOR UNION	1
72	PH12M-11	BAND FOR UNION	1
73-1	AJ13P-00	SPI - 320 MC	1
73-2	W470M-04A	WIRE CONNECTOR (45)	1
73-3	W470M-04A	WIRE CONNECTOR (45)	1
73-4	W470M-04A	WIRE CONNECTOR (45)	1
73-5	W470M-04A	WIRE CONNECTOR (45)	1
73-6	W470M-04A	WIRE CONNECTOR (45)	1
73-7	W470M-04A	WIRE CONNECTOR (45)	1
73-8	W470M-04A	WIRE CONNECTOR (45)	1
73-9	W470M-04A	WIRE CONNECTOR (45)	1
73-10	W470M-04A	WIRE CONNECTOR (45)	1
73-11	W470M-04A	WIRE CONNECTOR (45)	1
73-12	W470M-04A	WIRE CONNECTOR (45)	1
73-13	W470M-04A	WIRE CONNECTOR (45)	1
73-14	W470M-04A	WIRE CONNECTOR (45)	1
73-15	W470M-04A	WIRE CONNECTOR (45)	1
73-16	W470M-04A	WIRE CONNECTOR (45)	1
73-17	W470M-04A	WIRE CONNECTOR (45)	1
73-18	W470M-04A	WIRE CONNECTOR (45)	1
73-19	W470M-04A	WIRE CONNECTOR (45)	1
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73-22	W470M-04A	WIRE CONNECTOR (45)	1
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73-27	W470M-04A	WIRE CONNECTOR (45)	1
73-28	W470M-04A	WIRE CONNECTOR (45)	1
73-29	W470M-04A	WIRE CONNECTOR (45)	1
73-30	W470M-04A	WIRE CONNECTOR (45)	1
73-31	W470M-04A	WIRE CONNECTOR (45)	1
73-32	W470M-04A	WIRE CONNECTOR (45)	1
73-33	W470M-04A	WIRE CONNECTOR (45)	1
73-34	W470M-04A	WIRE CONNECTOR (45)	1
73-35	W470M-04A	WIRE CONNECTOR (45)	1
73-36	W470M-04A	WIRE CONNECTOR (45)	1
73-37	W470M-04A	WIRE CONNECTOR (45)	1
73-38	W470M-04A	WIRE CONNECTOR (45)	1
73-39	W470M-04A	WIRE CONNECTOR (45)	1
73-40	W470M-04A	WIRE CONNECTOR (45)	1
73-41	W470M-04A	WIRE CONNECTOR (45)	1
73-42	W470M-04A	WIRE CONNECTOR (45)	1
73-43	W470M-04A	WIRE CONNECTOR (45)	1
73-44	W470M-04A	WIRE CONNECTOR (45)	1
73-45	W470M-04A	WIRE CONNECTOR (45)	1
73-46	W470M-04A	WIRE CONNECTOR (45)	1
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73-49	W470M-04A	WIRE CONNECTOR (45)	1
73-50	W470M-04A	WIRE CONNECTOR (45)	1
73-51	W470M-04A	WIRE CONNECTOR (45)	1
73-52	W470M-04A	WIRE CONNECTOR (45)	1
73-53	W470M-04A	WIRE CONNECTOR (45)	1
73-54	W470M-04A	WIRE CONNECTOR (45)	1
73-55	W470M-04A	WIRE CONNECTOR (45)	1
73-56	W470M-04A	WIRE CONNECTOR (45)	1
73-57	W470M-04A	WIRE CONNECTOR (45)	1
73-58	W470M-04A	WIRE CONNECTOR (45)	1
73-59	W470M-04A	WIRE CONNECTOR (45)	1
73-60	W470M-04A	WIRE CONNECTOR (45)	1
73-61	W470M-04A	WIRE CONNECTOR (45)	1
73-62	W470M-04A	WIRE CONNECTOR (45)	1
73-63	W470M-04A	WIRE CONNECTOR (45)	1
73-64	W470M-04A	WIRE CONNECTOR (45)	1
73-65	W470M-04A	WIRE CONNECTOR (45)	1
73-66	W470M-04A	WIRE CONNECTOR (45)	1
73-67	W470M-04A	WIRE CONNECTOR (45)	1
73-68	W470M-04A	WIRE CONNECTOR (45)	1
73-69	W470M-04A	WIRE CONNECTOR (45)	1
73-70	W470M-04A	WIRE CONNECTOR (45)	1
73-71	W470M-04A	WIRE CONNECTOR (45)	1
73-72	W470M-04A	WIRE CONNECTOR (45)	1
73-73	W470M-04A	WIRE CONNECTOR (45)	1
73-74	W470M-04A	WIRE CONNECTOR (45)	1
73-75	W470M-04A	WIRE CONNECTOR (45)	1
73-76	W470M-04A	WIRE CONNECTOR (45)	1
73-77	W470M-04A	WIRE CONNECTOR (45)	1
73-78	W470M-04A	WIRE CONNECTOR (45)	1
73-79	W470M-04A	WIRE CONNECTOR (45)	1
73-80	W470M-04A	WIRE CONNECTOR (45)	1
73-81	W470M-04A	WIRE CONNECTOR (45)	1
73-82	W470M-04A	WIRE CONNECTOR (45)	1
73-83	W470M-04A	WIRE CONNECTOR (45)	1
73-84	W470M-04A	WIRE CONNECTOR (45)	1
73-85	W470M-04A	WIRE CONNECTOR (45)	1
73-86	W470M-04A	WIRE CONNECTOR (45)	1
73-87	W470M-04A	WIRE CONNECTOR (45)	1
73-88	W470M-04A	WIRE CONNECTOR (45)	1
73-89	W470M-04A	WIRE CONNECTOR (45)	1
73-90	W470M-04A	WIRE CONNECTOR (45)	1
73-91	W470M-04A	WIRE CONNECTOR (45)	1
73-92	W470M-04A	WIRE CONNECTOR (45)	1
73-93	W470M-04A	WIRE CONNECTOR (45)	1
73-94	W470M-04A	WIRE CONNECTOR (45)	1
73-95	W470M-04A	WIRE CONNECTOR (45)	1
73-96	W470M-04A	WIRE CONNECTOR (45)	1
73-97	W470M-04A	WIRE CONNECTOR (45)	1
73-98	W470M-04A	WIRE CONNECTOR (45)	1
73-99	W470M-04A	WIRE CONNECTOR (45)	1
73-100	W470M-04A	WIRE CONNECTOR (45)	1

A : MOLYKOTE X5
B : SCREW LOCK
C : DIA BOND DN83

EXPLODED VIEW

Tape Deck : C-300/500





NOTE: A=(USA), B=(J,B,BB)

NO	PARTS	NAME	PARTS NO	MATERIAL	Q'TY	REMARK
1	PANEL	FRONT	3-324-003-01	AL A6063-T5	1	A,B
2	FOOT	R	3-127-907-01	AL A6063-T5	1	A,B
3	FOOT	L	3-127-906-01	AL A6063-T5	1	A,B
4	PANEL	BASE	3-324-017-02	ABS-720 94-HB	1	A,B
5	DOOR	HOLDER	3-324-007-02	ABS-720 94-HB	1	A,B
6	DOOR	COVER	3-324-004-01	AL A6063-T5	1	A,B
7	LENS	KNOB	3-324-012-02	SBR(K-REGIN)94-HB	1	A,B
8	KNOB	TACT	3-819-804-01	ABS-720 94-HB	1	A,B
9	PCB	ASS'Y	A-170-857-01	MAIN	1	A,B
10	DECK	MECHANISM	2-216-109-01	HM-100LM DENON	1	A,B
11	MECHA	FOOT	3-324-010-01	ABS-720 94-HB	4	A,B
12	FOOT	REAR	3-324-011-01	ABS-720 94-HB	1	A,B
13	COVER	SCREW	3-324-027-01	EVA GRAY	4	A,B
14	CHASSIS	MAIN	3-324-016-02	SECC 1.0T	1	A,B
15	SUPPORT	PCB	3-810-520-01	NYLON 66	3	A,B
16	PANEL	REAR(C500)	3-324-015-11	SECC 0.8T	1	A,B
16	PANEL	REAR(C300)	3-324-102-11	SECC 0.8T	1	A,B
17	TOP	COVER	3-324-014-01	SECC 0.8T	1	A,B
18	MECHA	BRK'T	3-324-502-01	SECC 1.2T	1	A,B
S1	SCREW		7-764-408-01	VBZ30P080FZK	16	A,B
S2	SCREW		7-768-420-01	VBZ40P200FZK	4	A,B
S3	SCREW		7-464-408-01	CBZ30P080FZK	8	A,B
S4	SCREW		7-344-408-01	ATZ30P080FZK	2	A,B
S5	SCREW		7-764-410-01	VBZ30P100FZK	2	A,B

ELECTRICAL PARTS LIST

Tape Deck : C-300/500

REF. No	Part No.	Description
PCB-1 MAIN P.C. BOARD		
INTEGRATED CIRCUITS		
IC402	244131372	LA2000 MUSIC SEARCH
IC501 (C500)	2442241541	UPC1297CA HX Pro
IC401	2440929321	HA12170NT DOLBY B.C
TRANSISTORS		
Q401, 402, 498, 499	240215415	KTC2878A
△ Q1, 6	240111221	KTB1366Y
Q4	240014025	KTA966AY
Q303, 305 (501, 502 : C500)	240010825	KTA1271Y
Q2, 3, 5, 7, 8, 301, 302	240211135	KTC3198GR
403, 404, 405, 497		
Q10, 13	240611115	KSR1010 R1=10KΩ
Q9, 18, 19, 307 (503 : C500)	240612715	KSC106M R1=4.7KΩ R2=47KΩ
Q14, 66	240612615	KRA106M R1=4.7KΩ R2=47KΩ
Q304, 306	240610415	KRC103M
Q308	240210925	KTC1627A-Y, PA,
DIODES		
△ D5, 6, 9, 12, 13, 301, 303, 304 (501, 502 : C500)	241017995	1SS133
△ D1, 2, 3, 4, 302	2413581651	1N4003L
D7, 11	2426128851	ZENER, HZ12B2LTA
D8	242106245	ZENER, 1N753A
D10	242105135	ZENER, 1N751A
COILS		
T301 (C500)	212935201	BIAS OSC, 105KHz
T301 (C300)	212921501	RTF-057-0, LINE
L501, 502 (C500)	213850801	126AN-6750 HX-Pro
CONTROLS		
VR501, 502 (C500)	251210301	10KB
VR301, 302 (C300)	251210401	100KB
RESISTORS		
R1, 11	111415225	1.5 KΩ, 1/4W, ±5%
R2, 12	111447125	470 Ω, 1/4W, ±5%
R3, 13, 412	111410125	100 Ω, 1/4W, ±5%
R4	130410925	1 Ω, 1/4W, ±5%, FUSE
R5 8, 9, 81, 82, 83, 415, 416, 89	111810225	1KΩ, 1/8W, ±5%
R6	111847125	470Ω, 1/8W, ±5%
R7	111810125	100Ω, 1/8W, ±5%
R10, 22, 23, 318, 313 (508 : C500)	111810325	10KΩ, 1/8W, ±5%
R14	111427925	2.7Ω, 1/4W, ±5%
R88	111847025	47Ω, 1/4W, ±5%
△ R302, 303	111847925	4.7Ω, 1/8W, ±5%
R304, 305, 320	111833225	3.3KΩ, 1/8W, ±5%
R306	111439125	390Ω, 1/4W, ±5%
R307	111447125	470Ω, 1/4W, ±5%
R308, 309	111462125	620Ω, 1/4W, ±5%
R310, 311	111439025	39Ω, 1/4W, ±5%
R312, 316, 319, 398, 399, 405, 406, 409, 410	111822325	22KΩ, 1/8W, ±5%
494 (503, 504, 510 : C500)		
R314, 315	111868225	6.8Ω, 1/8W, ±5%
R403, 404	111856225	5.6KΩ, 1/8W, ±5%
R407, 408	111856125	560Ω, 1/4W, ±5%
R411	111818325	18KΩ, 1/8W, ±5%
R417, 418	111822225	2.2KΩ, 1/8W, ±5%
R419, 420	111882225	8.2KΩ, 1/8W, ±5%
R421, 422	111830225	3KΩ, 1/8W, ±5%
R423, 424, 429, 430, 495, 496, 497 (507, 509 : C500)	111847225	4.7KΩ, 1/8, ±5%
R425, 426	111833325	33KΩ, 1/8, ±5%
R427, 428	111818225	1.8KΩ, 1/8, ±5%
R431	111856425	560KΩ, 1/8, ±5%
R432	111868125	680Ω, 1/8, ±5%
R433	111818125	180Ω, 1/8, ±5%
R434	111882125	820Ω, 1/8, ±5%
R498, 499	111836225	3.6KΩ, 1/8, ±5%
R501, 502 (C500)	111818425	180KΩ, 1/8, ±5%
R505, 506 (C500)	111815325	15KΩ, 1/8, ±5%

REF. No	Part No.	Description
MISCELLANEOUS		
SW999	220899901	KHH-10910 TACT SW
CN101	216812301	NKC-023-0, 4P
CN106, 107	216817901	B3B-XH, JST
CN102, 103, 104, 105	216825201	FKN1039-A, JST
CN115	216846901	52303-1311, 13P
JP102	215561801	RCA JACK, GOLD, WHITE, RED, 4P
HEA101, 102	371070203	40MM, AL, HEAT SINK
CAPACITORS		
C1, 2, 436	175647395	47000pF, $\pm 20\%$, 50V
△ C3	141447267	4700 μ F, $\pm 20\%$, 25V, ELEC
C4, 10	141347167	470 μ F, $\pm 20\%$, 16V, ELEC
C5, 11	141310267	1000 μ F, $\pm 20\%$, 16V, ELEC
C7	141247165	470 μ F, $\pm 20\%$, 10V, ELEC
C8 (515 : C500)	141610065	10 μ F, $\pm 20\%$, 50V, ELEC
C9	141422267	2200 μ F, $\pm 20\%$, 25V, ELEC
C12, 516	141647965	4.7 μ F, $\pm 20\%$, 50V, ELEC
C13, 401, 402, 413, 414, 418	141601065	1 μ F, $\pm 20\%$, 50V, ELEC
C301	150E82245	0.0082 μ F, $\pm 5\%$, 400V
C302	150610345	0.01 μ F, $\pm 5\%$, 50V
C303, 304	150633245	0.0033 μ F, $\pm 5\%$, 50V
C305, 403, 404, 405, 406, 407, 408	150622245	0.0022 μ F, $\pm 5\%$, 50V
C306	141422065	22 μ F, $\pm 20\%$, 25V, ELEC
C409, 410, 411, 412, 422, 423, 434, 435	141610865	0.1 μ F, $\pm 20\%$, 50V, ELEC
514, 517		
C415, 416	141622965	2.2 μ F, $\pm 20\%$, 50V, ELEC
C420, 421	141310065	10 μ F, $\pm 20\%$, 16V, ELEC
C419, 437	141322065	22 μ F, $\pm 20\%$, 16V, ELEC
C431, 432	188618145	180pF, $\pm 5\%$, 50V
C433	141647865	0.47 μ F, $\pm 20\%$, 50V, ELEC
C501, 502 (C500)	188639145	390pF, $\pm 5\%$, 50V
C503, 504 (C500)	188F18155	180pF, $\pm 5\%$, 500V
C505, 506 (C500)	150647345	0.047 μ F, $\pm 5\%$, 50V
C507, 508 (C500)	150622345	0.022 μ F, $\pm 5\%$, 50V
C509, 510 (C500)	188610345	10000pF, $\pm 5\%$, 50V
C511, 512 (C500)	188682145	820pF, $\pm 5\%$, 50V
C513 (C500)	188F10145	100pF, $\pm 5\%$, 500V
C999	175610395	10000pF, $\pm 20\%$, 50V
PCB-2 SUB P.C. BOARD		
INTEGRATED CIRCUITS		
IC201	244220541	UPC4570C
TRANSISTORS		
Q101, 102, 103, 104	2402179651	2SC1775FTZ
Q113, 114, 205, 206	240215415	KTC2878A, RF/SW
Q109, 110, 111, 112	240211815	KTC3200GR
Q105, 106, 115	240211135	KTC3198GR
Q12, 13, 20, 21	240611115	KSR1010, R1=10K Ω
Q116, 119, 120, 121, 201, 202	240612715	KRC106M R1=4.7K Ω R2=47K Ω
Q117	240612615	KRA106M R1=4.7K Ω R2=47K Ω
Q118	240011425	KTA1268BL
Q203, 204	240610415	KRC103M
DIODES		
D101, 103, 201, 202	241017995	1SS133, TP
D102	2426105851	ZENER, HZ11B2LTA
COILS		
L101, 102	212938701	22mH, $\pm 10\%$, CHOKE
L201, 202	101147221	NTH-030-0, 4.7mH, $\pm 5\%$
L203, 204	212926101	NTH-061-0, BIAS TRAP
CONTROLS		
VR101, 102, 201, 202	2514203011	20KB, EVNDCAA05B24

REF. No

R27
R117, 118
R101, 102
R103, 104
R105, 106
R107, 108, 203, 204,
R109, 110
R137, 138, 139, 140, 143, 144, 150, 151
152, 219, 220, 221, 222, 215, 216
R145, 146, 207, 208
R111, 112
R113, 114
R119, 120
R227, 228
R121, 122
R123, 124
R125, 126
R127, 128, 141, 142
R131, 132
R147
R148
R149
R205, 206
R209, 210
R211, 212 (C300)
R211, 212 (C500)
R213, 214 (217, 218:(C500)
R129, 130
R115, 116
R201, 202, 225, 226
R223, 224
R217, 218(C300)

C101, 102
C103, 104
C107, 108, 201, 202
C109, 110
C111, 112, 116
C113, 114
C117
C115
C203, 204
C205, 206
C207, 208
C209, 210
C211, 212
C219, 220
C213, 214
C255, 266
C257, 258
C315, 216

CN108
CN110
CN112, 114
CN111, 113

Part No.**RESISTORS**

111410125
111810225
111810125
111822325
111833125
111856225
111847025
111810325

111822325
111822425
111868125
111836225
111833225
111868425
111891225
111882125
111839225
111824225
111447925
111410225
111822225
111847225
111833325
111815125
111818125
111815225
111810525
111833125
111868225
111882325
111824225

CAPACITORS

188633145
141447965
150662245
150668245
141310065
150612245
141333065
141347167
141601065
141610065
141615865
141647965
150612345
150622245
150620345
150610345
150675245
150618345

MISCELLANEOUS

216845401
2168385011
2168382011
2168387011

Description

100Ω, 1/4W, ±5%
1KΩ, 1/8W, ±5%
100Ω, 1/8W, ±5%
22KΩ, 1/8W, ±5%
330Ω, 1/8W, ±5%
5.6KΩ, 1/8W, ±5%
47Ω, 1/8W, ±5%
10KΩ, 1/8W, ±5%

22KΩ, 1/8, ±5%
220KΩ, 1/8, ±5%
680Ω, 1/8, ±5%
3.6KΩ, 1/8, ±5%
3.3KΩ, 1/8, ±5%
680KΩ, 1/8, ±5%
9.1KΩ, 1/8, ±5%
820Ω, 1/8, ±5%
3.9KΩ, 1/8, ±5%
2.4KΩ, 1/8, ±5%
4.7Ω, 1/4, ±5%
1KΩ, 1/4, ±5%
2.2KΩ, 1/8, ±5%
4.7KΩ, 1/8, ±5%
33KΩ, 1/8, ±5%
150Ω, 1/8, ±5%
180Ω, 1/8, ±5%
1.5KΩ, 1/8, ±5%
1MΩ, 1/8, ±5%
330Ω, 1/8, ±5%
6.8KΩ, 1/8, ±5%
82KΩ, 1/8, ±5%
2.4KΩ, 1/8, ±5%

330pF, ±5%, 50V
4.7μF, ±20%, 25V, ELEC
0.0062μF, ±5%, 50V
0.0068μF, ±5%, 50V
10μF, ±20%, 16V, ELEC
0.0012μF, ±5%, 50V
33μF, ±20%, 16V, ELEC
470μF, ±20%, 16V, ELEC
1μF, ±20%, 50V, ELEC
10μF, ±20%, 50V, ELEC
0.15μF, ±20%, 50V, ELEC
4.7μF, ±20%, 50V, ELEC
0.012μF, ±5%, 50V
0.0022μF, ±5%, 50V
0.02μF, ±5%, 50V
0.01μF, ±5%, 50V
0.0075μF, ±5%, 50V
0.018μF, ±5%, 50V

PCB-3 SUB P.C. BOARD**RESISTORS**

111818125

180Ω, 1/8, ±5%, TP

MISCELLANEOUS

215978901
241949345

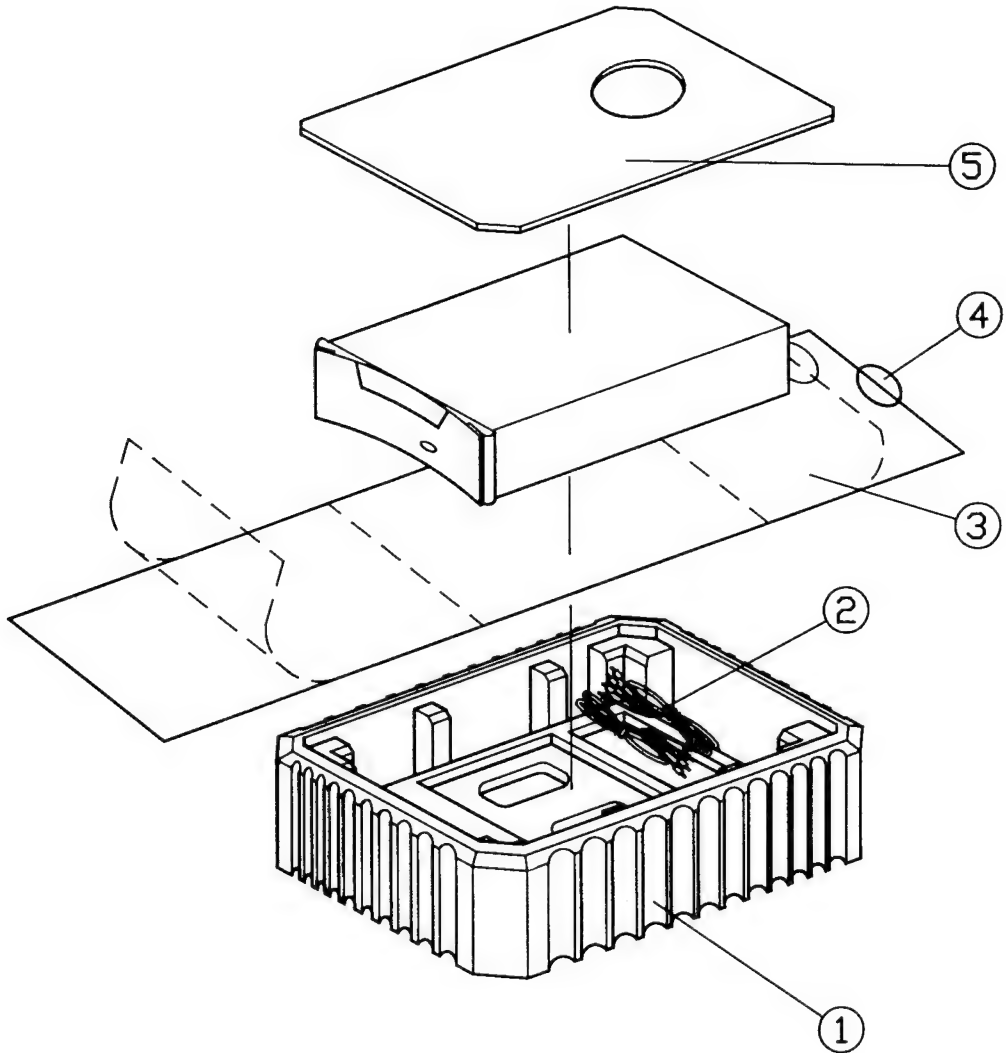
2.5MM, 4P, L=450 CONNECTOR
R34MC F02, LED,

R21

JP101
D999

PACKING DRAWING

Tape Deck : C-300/500



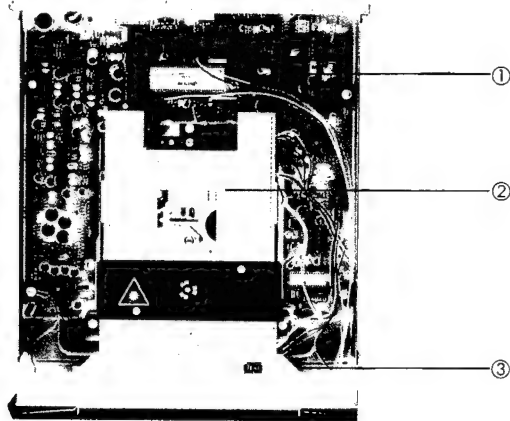
NO	PARTS NAME	PARTS NO.	Q'TY
1	PAD BOTTOM	3-127-916-01	1
2	PIN CORD	2-212-140-01	2
3	SHEET POLY	3-324-029-01	1
4	STICKER SET	3-819-817-01	1
5	INNER LID	3-324-019-01	1

CDP SECTION

4 HK-CD 300/500

INTERNAL VIEW

TOP VIEW



- ① PCB-1 Main p.c.board
- ② PCB-2 Control p.c.board
- ③ CD Mechanism

DISASSEMBLY PROCEDURES

1 TOP Cover Removal

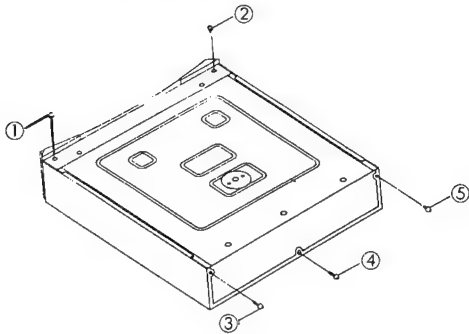


Fig. 1

1. Remove screws ① to ⑤ in Fig. 1
2. Remove the top cover

2 Rear Panel Removal

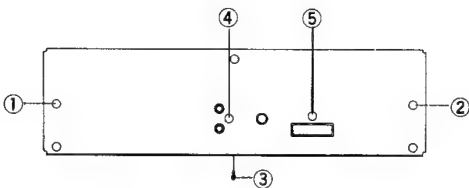


Fig. 2

1. Remove screws ① to ⑤ in Fig. 2, and then remove the rear panel

3 PCB-⑫ (Main PCB) Removal

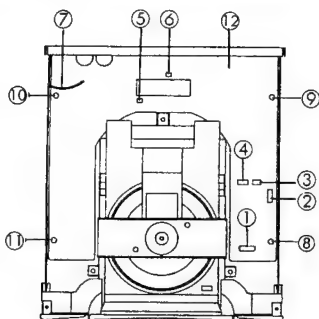


Fig. 3

1. Remove the rear panel (Refer to step ②)
2. Remove connectors ① to ⑥ in Fig. 3, and then unsolder the ground wire ⑦ which is connected the side frame (L)
3. Remove screws ⑧ to ⑪ in Fig. 3, and then remove main pcb ⑫ by pulling it to backward

4 Front Panel Assembly Removal

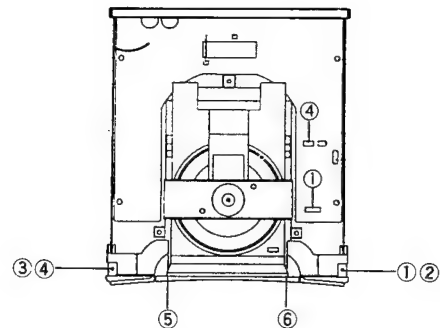


Fig. 4

1. Remove screws ① to ⑥ in Fig. 4.
2. Remove the front panel assembly by pulling it toward you gently

5 PCB-⑤ (Control PCB) Removal.

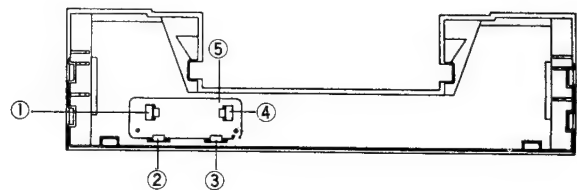


Fig. 5

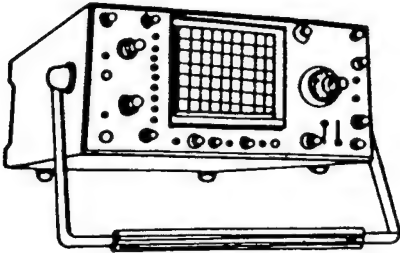
1. Remove the front panel assembly (Refer to step ④)
2. Pull hooks ① to ④ in Fig. 5, and then remove the control pcb ⑤

ALIGNMENT PROCEDURES

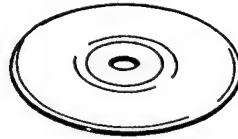
CDP:CD 300/500

1. METER AND JIG FOR ADJUSTMENT

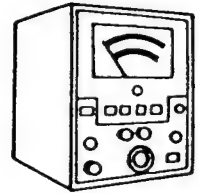
1-1. Oscilloscope



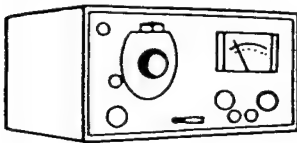
1-2 Test disc (Sony type 4:YEDS-18)



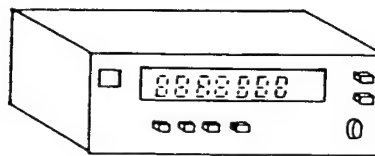
1-3. Jitter meter



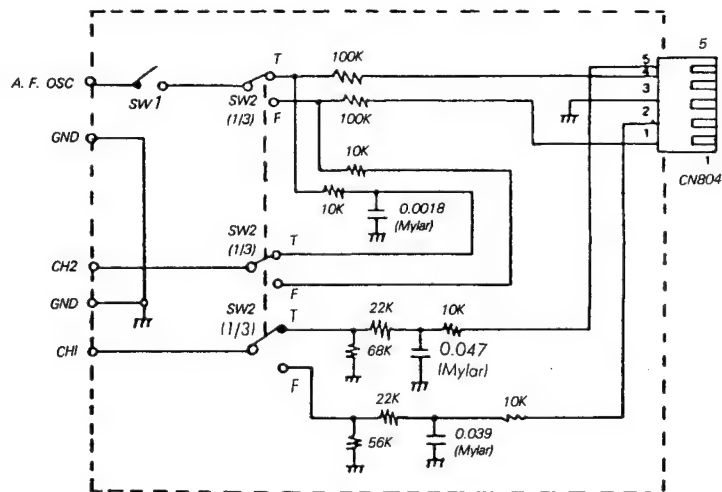
1-4. Low frequency oscillator



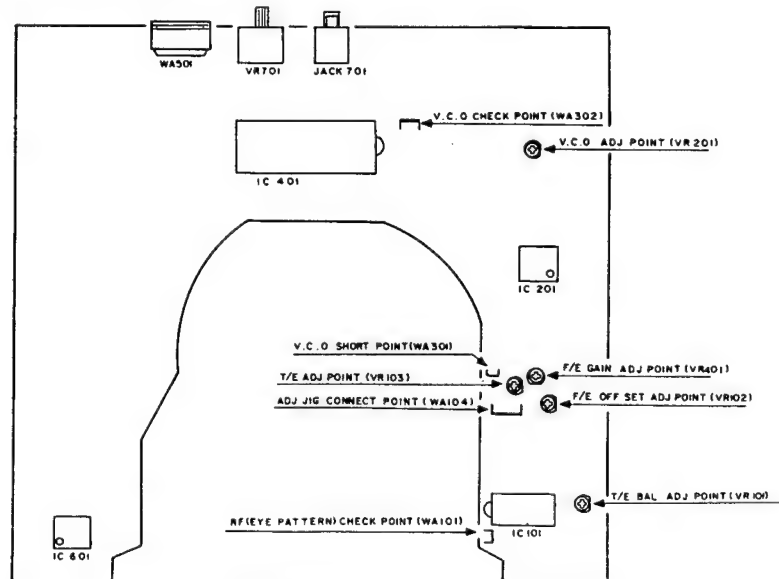
1-5. Digital frequency counter



1-6. 10:1 Oscilloscope probe
1:1 Oscilloscope probe



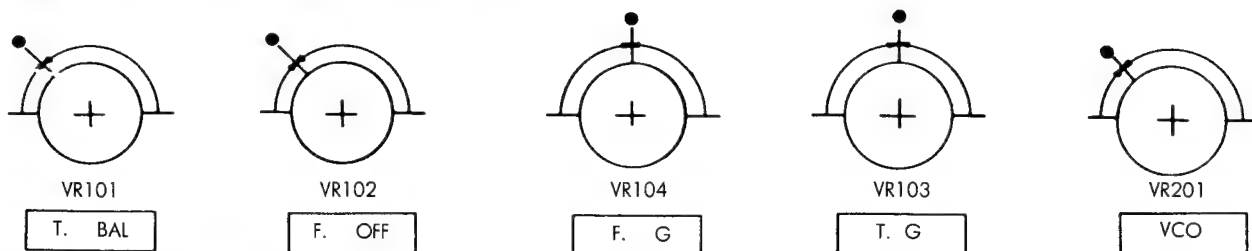
1-7. Focus & tracking gain adjustment



CDP: Adjustment point

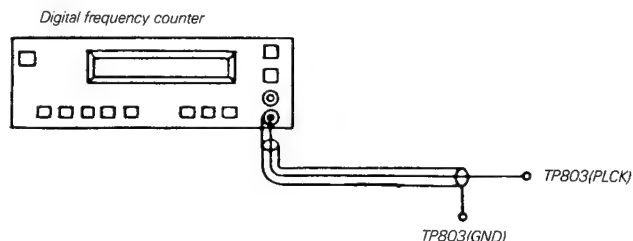
2. INITIAL SETTING OF ADJUSTMENT POTENTIOMETERS

Before adjusting, preset adjustment potentiometers like below.



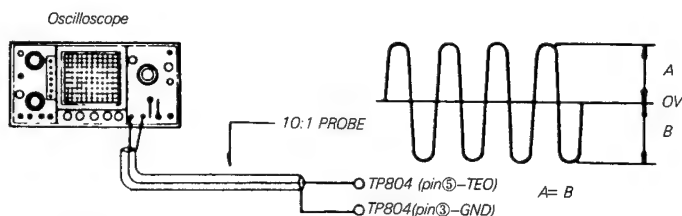
3. PLL (VCO) ADJUSTMENT

- (1) Connect digital frequency counter to WA302(PLCK) and WA302 (GND).
- (2) Shortcircuit WA301 (ASY) and WA301 (GND).
- (3) Adjust VR201 so that the frequency counter reading becomes 3.5MHz(± 10 KHz).



4. E-F BALANCE ADJUSTMENT

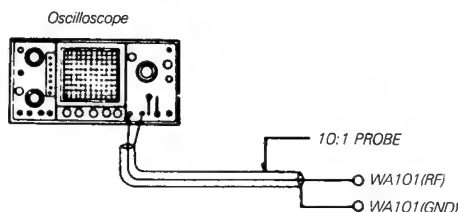
- (1) Connect the oscilloscope to WA104 (pin⑤-TEO)and WA104 (Pin③-GND).
- (2) Place test disc on turntable.
- (3) Shortcircuit WA104 (pin ④-TEI) and WA104(pin ③-GND)
- (4) Adjust VR101 so that the amplitude above and below the zero DC line becomes equal (amplitude A=B).
- (5) Open circuit WA104 (pin ④-TEI)and WA104 (pin ③-GND)



5. FOCUS OFFSET ADJUSTMENT (without jitter meter)

- (1) Place test disc on the turntable.
- (2) Put unit into play mode.
- (3) Connect oscilloscope to WA101 (RF) and wa101(GND).
- (4) Adjust VR102 so that eye pattern become clear and waveform (V_{p-p}) is maximum.

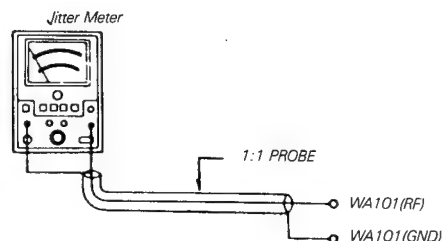
NOTE:When confirming eye pattern, you have to use 10:1 probe.



6. FOCUS OFFSET ADJUSTMENT (with jitter meter)

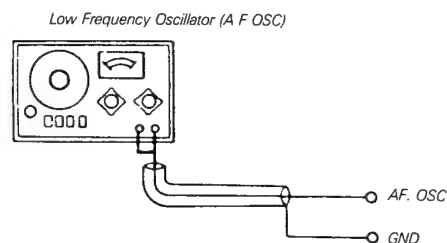
- (1) Connect the jitter meter to WA101 (RF) and WA101 (GND), set the input selection switch of jitter meter to position of "×1".
- (2) Place test disc on the turntable.
- (3) Put unit into play mode.
- (4) Adjust VR102 so that the jitter meter reading is minimum.

NOTE:Jitter meter must have input "×"made selection switch.

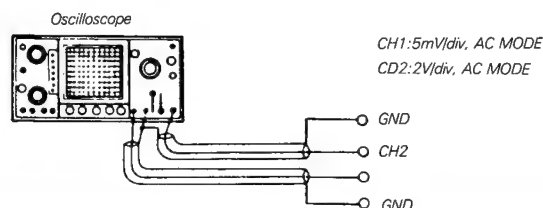


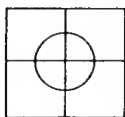
7. FOCUS GAIN ADJUSTMENT (with jig)

- (1) Connect CN804 from gain adjustment jig to WA104 on the main P. C. board pin to pin.
- (2) Connect audio frequency oscillator to A. F. OSC terminal and GND on the gain adjustment jig.
Set the audio frequency oscillator output to 550 Hz, 4 V_{RMS}

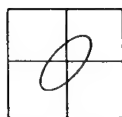


- (3) Connect oscilloscope to CH1, CH2, and GND on the main P. C. board.
- (4) Insert test disc and put unit into play mode on track.
- (5) Set switch SW2 on the gain adjustment jig to the position of "F".
- (6) Set switch SW1 on.
- (7) Adjust VR104 so that the waveform on the oscilloscope becomes like below.

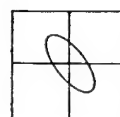




Good dajstment
(Optimum focus gain)



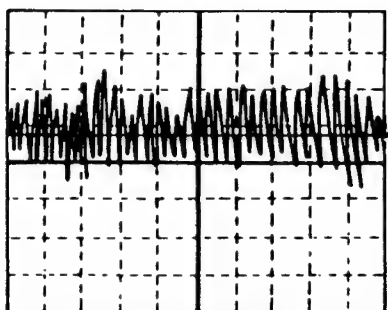
Bad adjustment
(In the case of low focus gain)



Bad adjustment
(In the case of high focus gain)

8. FOCUS GAIN ADJUSTMENT (without jig)

- (1) Connect the Oscilloscope to WA104 (pin ②-FEO) and WA104 (pin ⑤-GND)
- (2) Insert test disc and put unit into play mode on track.
- (3) Adjust VR104 so that the waveform on the oscilloscope becomes like below.

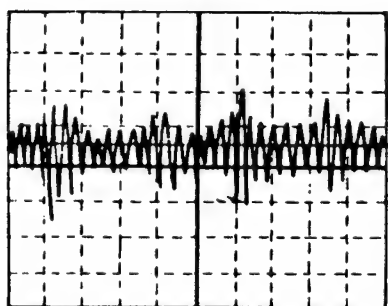


100mV/div: Volt/div.
2mS/div: Time/div.

80mV(The DC level of FEO waveform)

OV

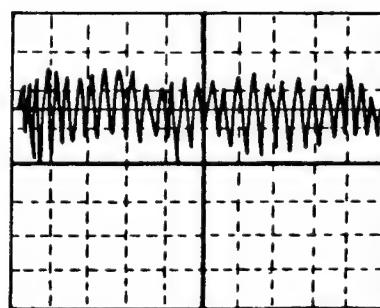
Good adjustment
(Optimum focus gain)



50mV

OV

Bad adjustment
(In the case of high focus gain)



125mV

OV

Bad adjustment
(In the case of low focus gain)

- (4) This method will be convenient in the field. In spite of simple method, this method will not make serious problems.

9. TRACKING GAIN ADJUSTMENT (with jig)

- (1) Connect CN804 from gain adjustment jig to WA104 on the main P. C. board pin to pin.
- (2) Connect audio frequency oscillator to A. F. OSC terminal and GND on the gain adjustment jig.

Set the audio frequency oscillator output to 550Hz, 4 V_{RMS}.

- (3) Connect oscilloscope to CH1, CH2 and GND on the main P. C. board.

- (4) Insert test disc and put unit into play mode on track.

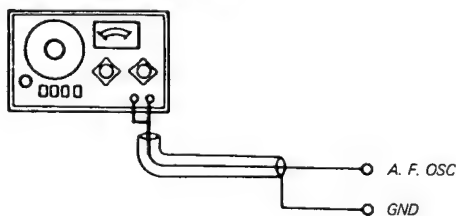
- (5) Set switch SW2 on the gain adjustment jig to the position of "T".

- (6) Set switch SW1 on.

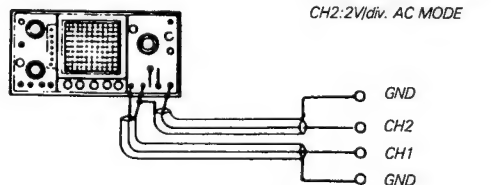
- (7) Adjust VR103 so that the waveform on the oscilloscope becomes like below.

- ① Good adjustment (Optimum tracking gain)
- ② Bad adjustment (In the case of low tracking gain)
- ③ Bad adjustment (In the case of high tracking gain)

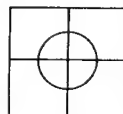
Low Frequency Oscillator (A F OSC)



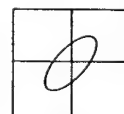
Oscilloscope



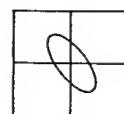
CH1: 50mV/DIV. AC MODE
CH2: 2V/div. AC MODE



①



②



③

CD-300/500 CDP BLOCK DIAGRAM



CIRCUIT DESCRIPTION

-CDP-

1. APC CIRCUIT

A semiconductor laser is used as the light source for the optical pickup. As the output from the semiconductor laser changes radically with changes in temperature, a circuit must be provided to stabilize this output. For this purpose, a monitor diode which detects the optical output of the laser diode is used in the semiconductor laser.

As the laser diode emits light from its bonded surface, light is emitted both in front and behind. The light emitted behind is monitored with the monitor diode installed on its rear surface, and the optical output is thus controlled. The light emitted in front becomes the light source for the pickup.

Fig. 1 shows the APC circuit.

When the temperature rises and the optical output decreases, the monitor diode current (I_S) decreases, the electric potential of IC101 pin 5 rises, the base current of the driving transistor increases, and the laser diode current increases. This causes the reduced optical output to return to its former level.

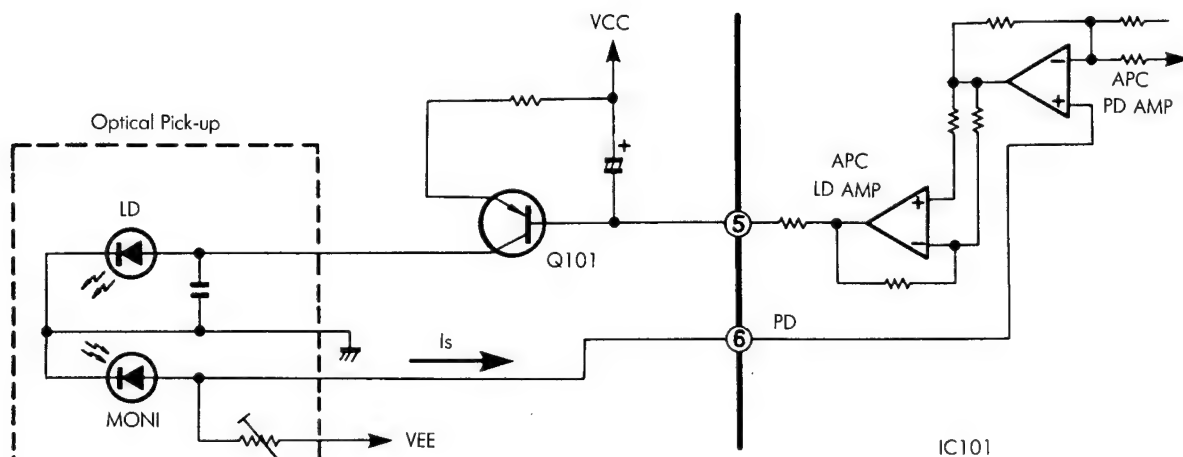


Fig. 1

2. FOCUS SERVO

2-1. Optical pickup

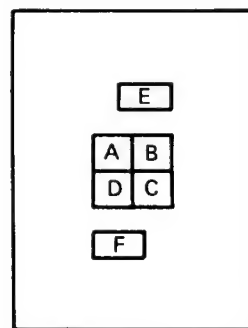
This set employs a three-beam optical pickup comprised of six division photodiodes, A through F as shown in Fig. 2. The four photodiodes (A through D) at the center provide focus error detection by using their property to allow the beam to focus into a round image only at a certain point.

The sums of outputs from diagonal two elements of four division photodiodes (A+C and B+D) are compared by the differential amplifier in IC101 to detect the shape of the beam image.

The remaining two diodes (E and F) provide tracking error detection by means of sub-beam spots.

2-2. Focus error detecting operation

The reflected laser beam from a disc is polarized 90° with the beam-splitter and sent to the cylindrical lens. The beam passed through this cylindrical lens is then sent to the four division photodiodes and focuses into an image whose shape varies with the distance between the disc and the objective lens. Such change in the beam shape causes the current flowing from the photodiodes to vary.



Three spotted (six-division)
photo diodes

Fig. 2

Shown in Fig. 3 is the Principle of the focus error detection.

The currents from the photodiodes (A+C and B+D) are applied to pins 7 and 8 of IC101 and converted to voltage by RF I-V amplifiers (1) and (2) included in IC101.

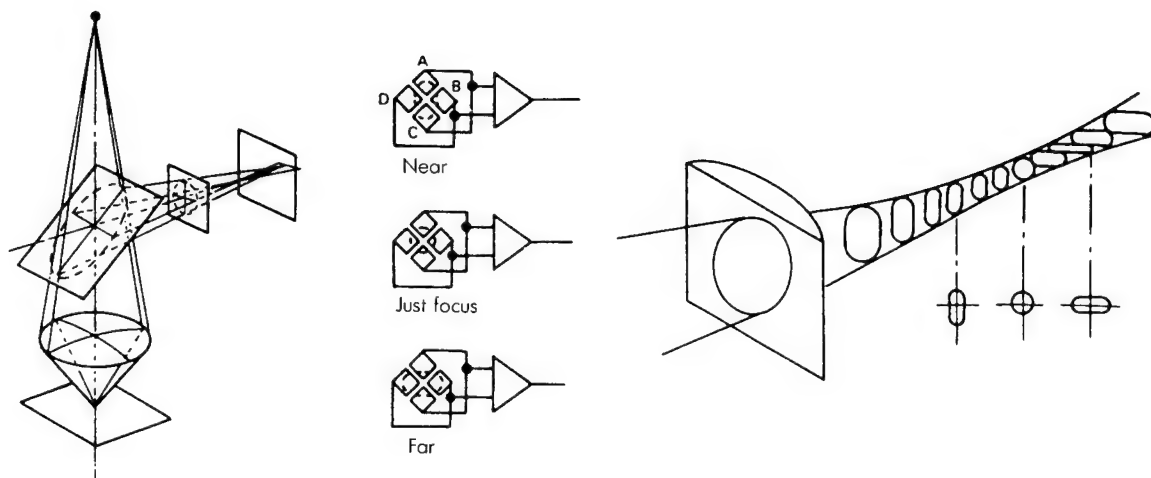


Fig. 3

2-3. Focus servo control operation

The focus error signal, after being converted to voltage by the RF I-V amplifier, is transmitted to the operation amplifier in the IC and output from pin 19.

When the disc to objective lens distance is in just focus, the beam forms a true round. In this state, the beams applied to four elements of four division photodiodes become equal and thus the output provided then is 0 (zero). When the disc to objective lens distance is too close (near focus), the beam is reflected divergently to form an oval in crosswise direction. In this state, the outputs provided from

photodiodes A and C are higher than those from B and D, resulting in negative (-) output voltage. On the other hand, when the distance is too far (far focus), the beam is reflected convergently to form an oval in longitudinal direction. Then the outputs from photodiodes B and D are higher, resulting in positive (+) output.

The output voltage (focus error signal) from pin 19 of IC101 passes through IC201, in from pin 48 and out from pin 5, and IC202, in from pin 4 out from pin 6 as shown in Fig. 4. It is amplified in each IC and fed to the focus coil which then drives the objective lens of the pickup.

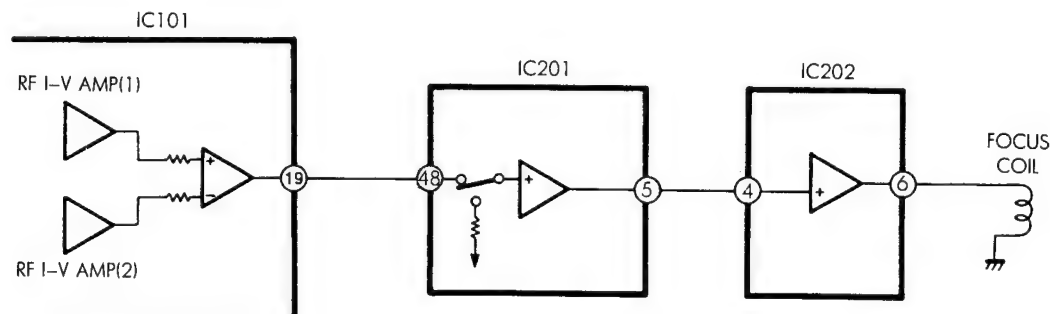


Fig. 4

2.4 Tracking error detection system

Fig. 5 shows the principle of the tracking error detection system which employs the three beam system.

The laser beam is divided into the main beam and two sub-beams by diffraction grating and they are arranged on one line. The center line connecting these three beams has a slight offset angle against the main beam. The main beam is received by photodiodes A, B, C and D and two sub-beams by E and F respectively.

Fig. 5-A shows the on-track state. As both auxiliary beams 1 and 2

are slightly on the track in this state, the outputs of photodiodes E and F are equal and the tracking signal is 0 (zero). When the track is shifted to the left (Fig. 5-B), the auxiliary beam 1 is off the pit. This allows more light to be received by the photodiode E, resulting in positive (+) tracking signal output. On the other hand, when the track is shifted to the right (Fig. 5-C), the amount of light received by the photodiode F increases, resulting in negative (-) tracking signal output. And these extreme signals are detected as tracking error signals.

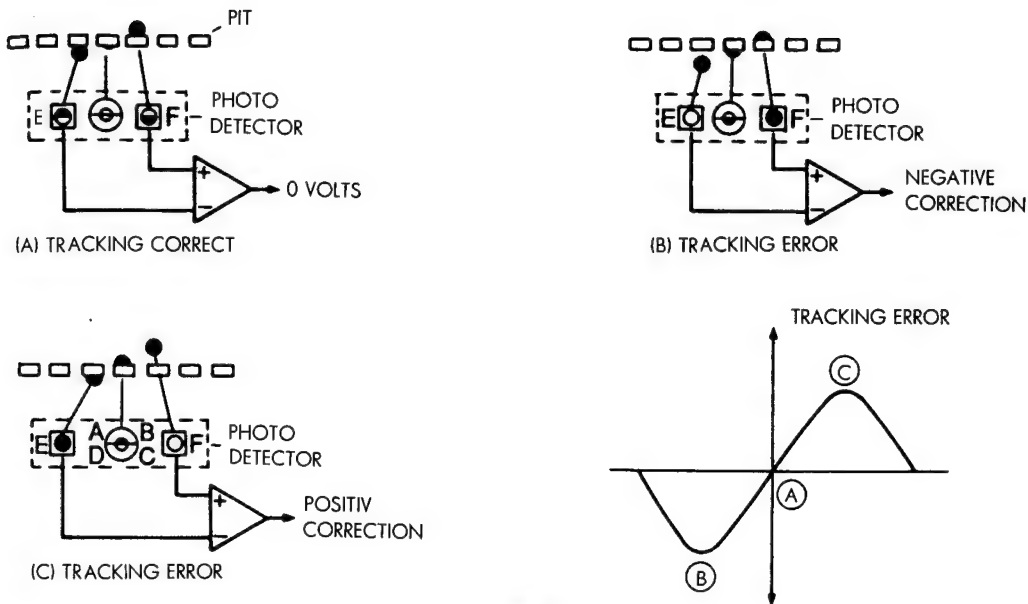


Fig. 5

2-5. Tracking servo control operation

When a tracking error signal is detected by photodiodes E and F, it is fed to pins 11 and 10 of IC101 respectively as shown in Fig. 6. In IC101, the signal is converted into voltage by the E I-V amplifier and F I-V amplifier, transmitted to the tracking error amplifier and

output through pin 20. While it passes through IC201, in from pin 45 and out from pin 11, and IC202, in from pin 3 and out from 7, it is amplified in each IC and sent to the tracking coil to adjust pickup so that the amount of track shift is reduced as closely to none as possible.

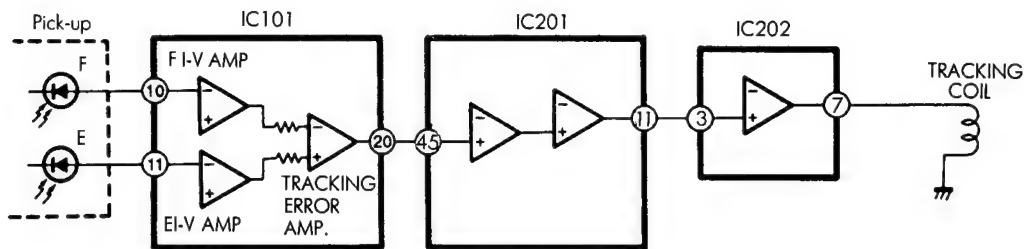


Fig. 6

3. Regenerative Circuit

3-1 RF circuit

The currents from photodiodes (a, b, c and d) are fed to IC101 through pins 7 and 8 and converted to voltage by RF I-V amplifiers (1) and (2) respectively there, added by the RF summing amplifier

and output from pin 2 as a signal. As it is sent to pin 5 of IC301, it can be checked at the test point (WA101) provided on its way by means of the eye pattern check.

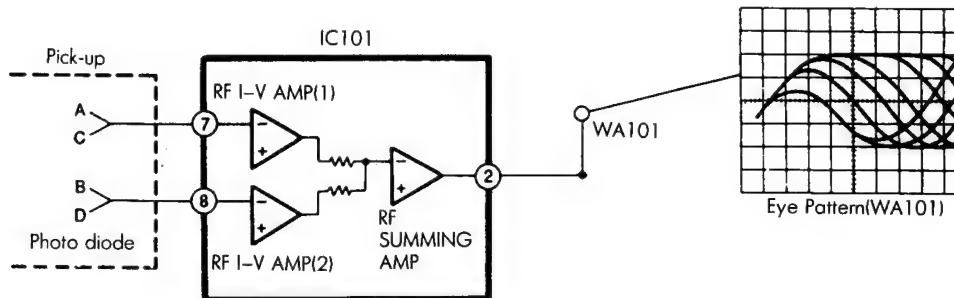


Fig. 7

3-2. EFM demodulation, error correction, serial/parallel conversion

EFM demodulation, error correction and serial/parallel conversion are performed by the internal circuitry of IC301. The eye-pattern signals from pin 27 of IC101 are sent to pin 5 of IC301, then de-

modulated from 14 bits to 8 bits by EFM readjustment. At the same time any error, if found, is corrected (CIRC) and the signals are sent to the D/A converter interface. After that, they are output as 18-bit digital signals from pins 76, 78 and 80 of IC301 and fed to the D/A converter of IC601.

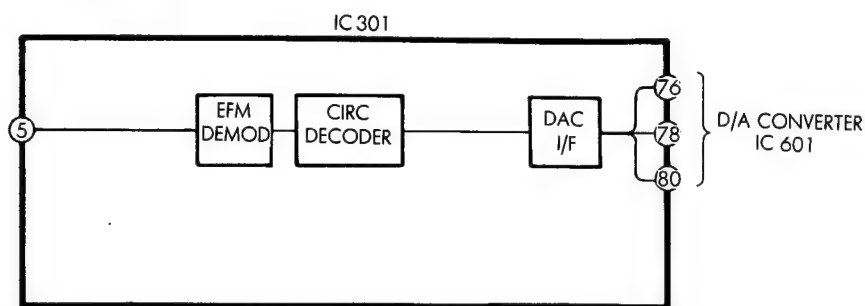


Fig. 8

4. 1-bit D/A Converter

Conventionally, high-precision D/A conversion was mainly carried out using resistor ladder systems. There was, however, one main drawback with these systems, which was that zero cross distortion was likely to be generated. To achieve production of a high-precision D/A converter with a minimum amount of zero cross distortion, it would be necessary to carry out complicated and bothersome processes such as laser trimming processing. In addition, use of such D/A converter would require a sampling-and-hold circuit(s) (or de-glitcher circuit) and an intricate analog filter with special characteristics. When mounting it.

To solve these difficulties, we used a 1-bit D/A converter with 3rd order noise shaping technology (IC601: MIN 6471M)

4-1. Features and Configuration of MN6471M

- Features
1. No zero cross distortion
 2. No non linear distortion
 3. Built-in 4 times oversampling digital filter
 4. 2 channels (left and right) built in
 5. 4DAC configuration possible
 6. Single 5V power supply operation

The block diagram is shown in Fig. 9. The MN6471M is configured of a digital filter, a 3rd order noise shaping circuit, and a PWM.

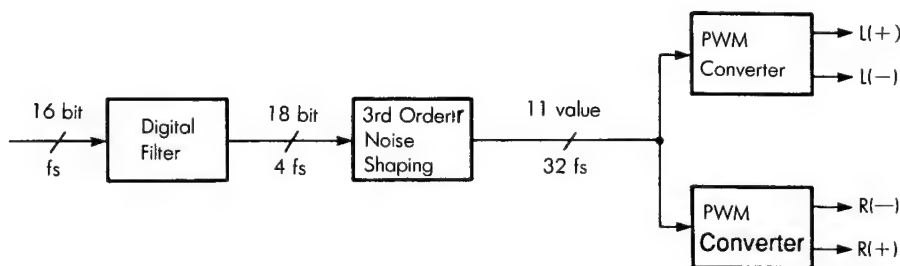


Fig. 9

4-2. Configuration of MN6471M

Fig. 10 shows the configuration of the MN6471M. The sampling frequency of the input data is expressed in f_s , so the 3rd order noise shaping circuit operates at $32f_s$. This means that a 32-times oversampling filter is required. In this LSI, however, oversampling is carried out first at $4f_s$ in the first digital filter, and following that, a 3rd order hold takes place in the 3rd order noise shaping circuit. This enables conversion of the $4f_s$ signal to a $32f_s$ signal.

The digital filter, using $384f_s$ as clock signals, and the noise shaping section, uses $64f_s$, carry out time division processing on the data for the left and right channels. The PWM section, using $768f_s$ as a clock signal, carries out signal processing for the left and right channels independently.

In the noise shaping section, the 19-bit $32f_s$ signal is converted to 11 values and pulse width modulation (PWM) is carried out on these signals in the PWM section. D/A conversion is carried out in this way. Following are the descriptions of the various blocks.

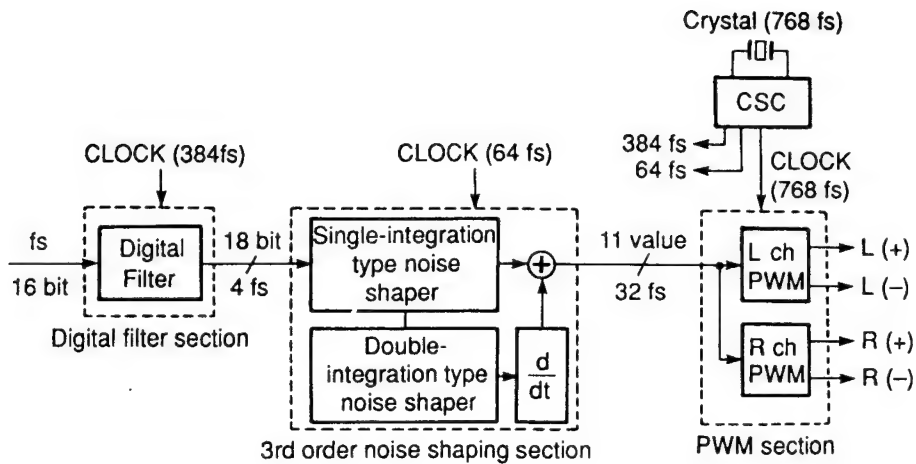


Fig. 10

5. Digital filter

Fig. 11 shows the signal data of an audio signal up to 20 kHz that has been digitalized, along with the frequency distribution of the signal data. The graphs show the conditions for a sampling frequency of 44.1 kHz, plus its doubled frequency, 88.2 kHz, and its quadrupled frequency, 176.4 kHz.

As the figure shows, for the same signal up to 20 kHz, the noise portion of the digitalized signal component tends to shift toward the higher range of the signal if the sampling frequency is increased. However, at any sampling frequency, the volume of necessary audio signal information remains constant up to 20 kHz. This allows certain important results to be derived; that is, if the information represented in section (a) is obtained, then it should be possible to create a signal in the form shown in (b) or (c).

When the noise caused by sampling shifts to the higher frequency range, as shown in (b) or (c), the low pass filter characteristic to eliminate noise during re-conversion to an audio signal need not be steep but can be rather gradual as shown. It is comparatively simple to provide a high audio quality low pass filter of such characteristic with little phase fluctuation or distortion.

The question now becomes how to make a signal sampled at 44.1 kHz resemble one sampled at a much higher frequency. Fig. 12 shows the signal sequence sampled at the same 44.1 kHz as in Fig. 11 and its frequency distribution.

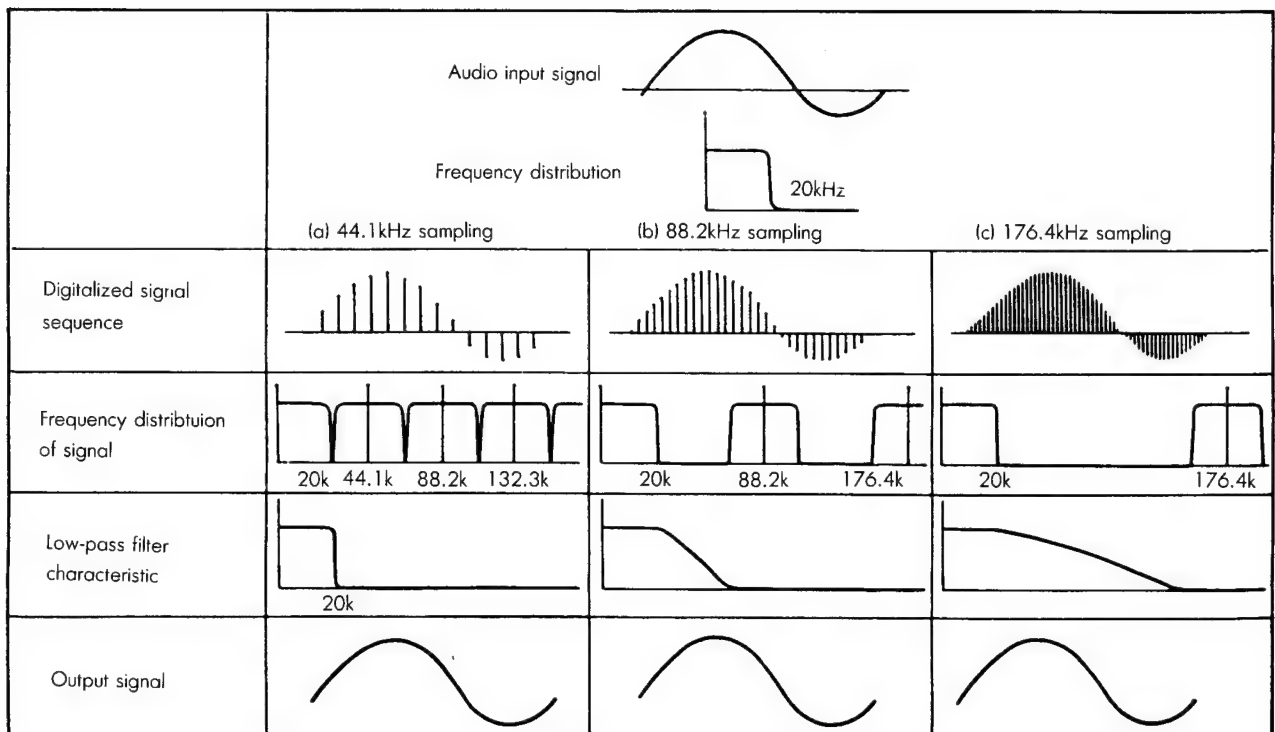


Fig. 11

If the frequency is to be doubled as the first step in increasing the sampling frequency of the signal, zero-level data is added between the data marked with X in Fig. 12(b). In the original signal sequence sampled at 44.1 kHz, there are data only at the points of the sampling timing, while the intervals between those points have all been made zero-level. Introducing zero data in these intervals does not change the original data in any way, nor is the frequency distribution altered. Only the sampling frequency is double.

Passing this data in its modified form through a digital filter with the characteristic shown in Fig. 12(c) causes the portion corresponding

to N_1 to be eliminated, resulting in a signal sequence with the frequency distribution shown in (d). This signal sequence possesses exactly the same shape as that obtained for the signal in Fig. 11(b), sampled at 88.2 kHz. In other words, this method enables the sampling frequency to be doubled.

The digital filter used in this unit is a Finite Impulse Response type. Its circuit diagram is shown in Fig. 13.

The sampling frequency of this unit has been quadrupled, and the phase characteristic has been improved by using a softer analog low-pass filter.

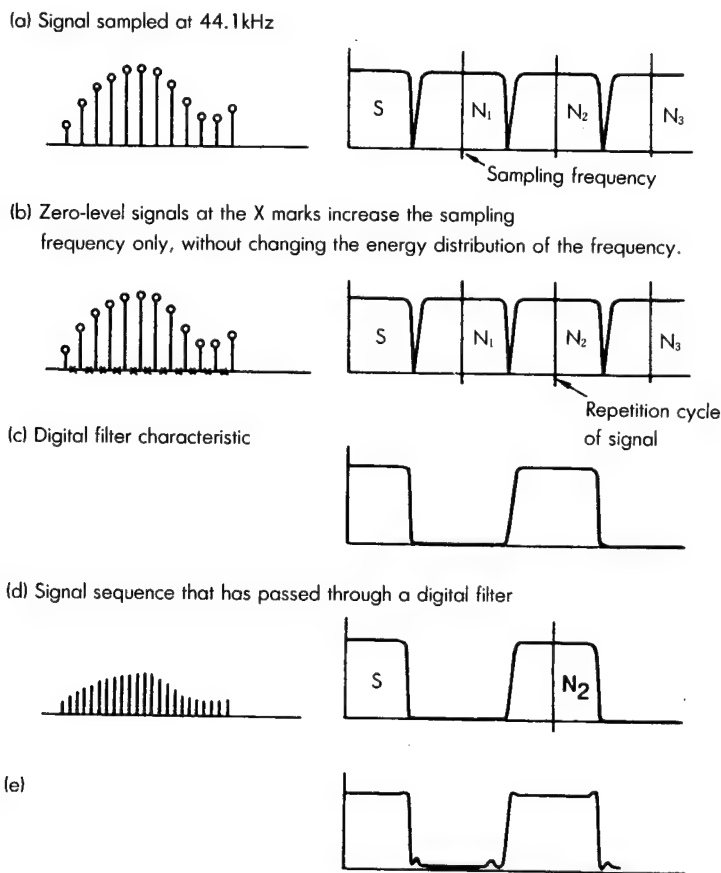


Fig. 12

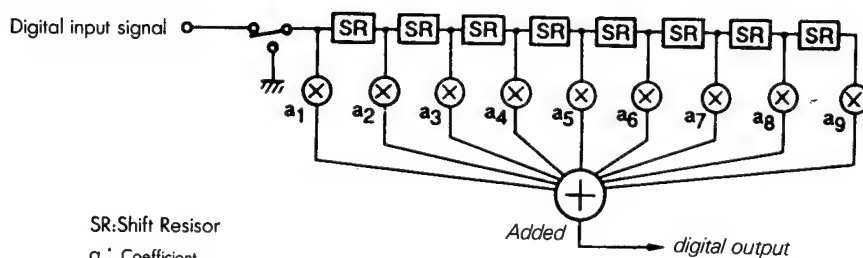


Fig. 13

6. Noise shaper

a) Single-integration noise shaper

The block diagram is shown in Fig. 14.

According to the figure, the relation between input X and output Y is as follows:

$$Y = X + (1 - Z^{-1})V_q \dots (1)$$

The quantization error V_q is a random value, and $(1 - Z^{-1})$ express-

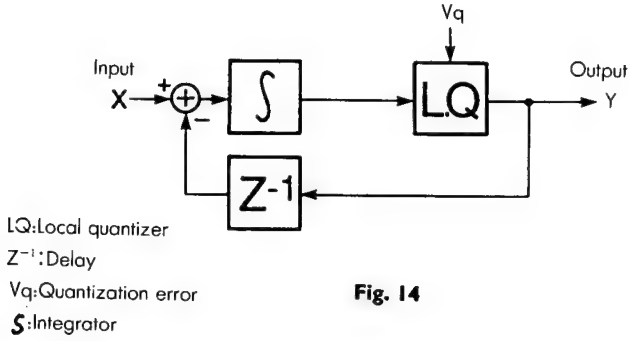


Fig. 14

In Fig. 15, the path to the output seen from W has a configuration identical to that of the single-integration noise shaper, so that relation between W and Y is:

$$Y = W + (1 - Z^{-1})V_q \dots (2)$$

The relation between X and Y is:

$$W = \frac{1}{1 - Z^{-1}}(X - Z^{-1}Y) \dots (3)$$

And the result obtained from above equations (2) and (3) is:

$$Y = X + (1 - Z^{-1})^2 V_q \dots (4)$$

Comparison with equation (1) shows that the term $(1 - Z^{-1})$ is a square of itself. In other words, with the double-integration noise shaper, the spectrum of the quantization error V_q is attenuated at a slope of 12dB/oct.

6-2. 3rd order noise shaper

The block diagram of the 3rd order noise shaper is shown in Fig. 17.

This configuration shows that the first stage uses a single-integration noise shaper and the following stage uses a double-integration noise shaper. The quantization error of the first stage is input at the second stage.

In this configuration, single-integration and double-integration noise shapers are connected at several stages, and the quantization error of the previous state is quantified again at the following stage, so that the quantization error included in the output of the previous stage is negated. In this way, compensation is carried out.

es the differential characteristic. Thus, according to equation (1), the spectrum of the quantization error V_q for the single-integration noise shaper has a characteristic of 6dB/oct, and the lower the frequency is, the greater the attenuation becomes. (This is because the noise distribution can be changed by the noise shaper).

b) Double-integration noise shaper

The block diagram is shown in Fig. 15.

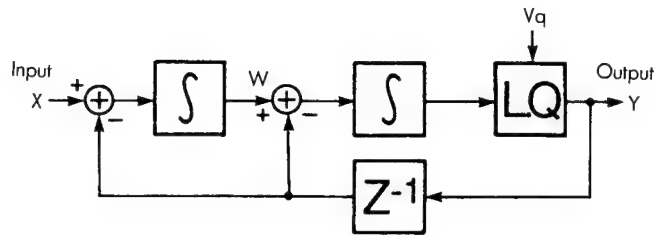


Fig. 15

Fig. 16 shows the output spectrum of the noise shaper.

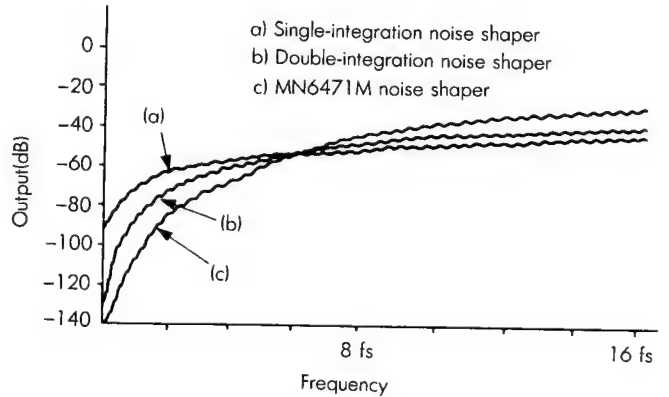


Fig. 16

In this noise shaping circuit, the input is expressed as X, the output as Y, and the re-quantized error as V_q , and their relation for each order is shown in the following equations.

$$(1\text{st order}) \quad Y = X + (1 - Z^{-1})V_q$$

$$(2\text{nd order}) \quad Y = X + (1 - Z^{-1})^2 V_q$$

$$(3\text{rd order}) \quad Y = X + (1 - Z^{-1})^3 V_q$$

In noise shaping, as the order of the transfer coefficient called $(1 - Z^{-1})$ becomes larger, the noise in the 1/2 fs audio band moves higher in the frequency range. The result is that, within a narrow audio band, an 18-bit performance can be obtained even from a 1-bit DAC

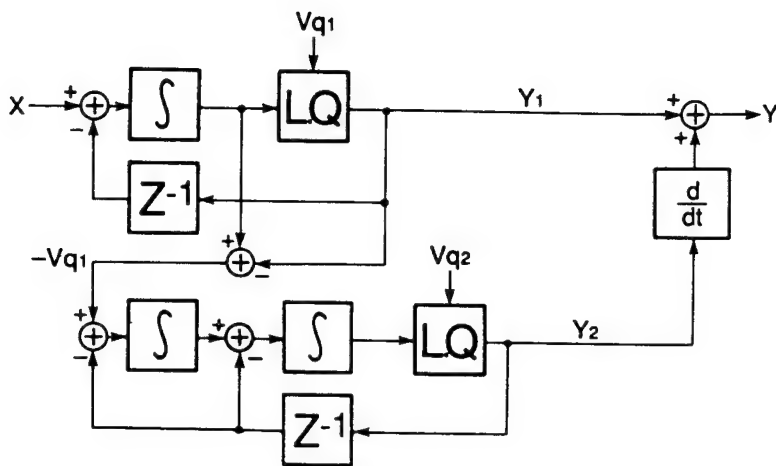


Fig. 17

$$Y_1 = X + (1 - Z^{-1}) V_{q1} \dots\dots\dots (5)$$

$$Y_2 = V_{q1} + (1 - Z^{-1})^2 V_{q2} \dots\dots\dots (6)$$

$$Y = Y_1 + (1 - Z^{-1}) Y_2 \dots\dots\dots (7)$$

The result obtained from above equations (5)–(7) is:

$$Y = X + (1 - Z^{-1})^3 V_{q2} \dots\dots\dots (8)$$

7. PWM Output Section

In the output from the MN6471M noise shaper, the 11 value data of the 32fs is output. In the PWM section, pulse width modulation (PWM) is carried out on that signal, enabling D/A conversion.

Fig. 18 shows the PWM section of the MN6471M.

The 11 value digital data output from the noise shaper is converted (1-bit data stream) to pulse signal With 11 pulse widths precisely controlled by the crystal OSC and output as an analog signal. In the PWM output section, signals from both left and right channels are output as differential output so that the synchronous-phase noise is eliminated and the 2nd order high-frequency distortion is reduced.

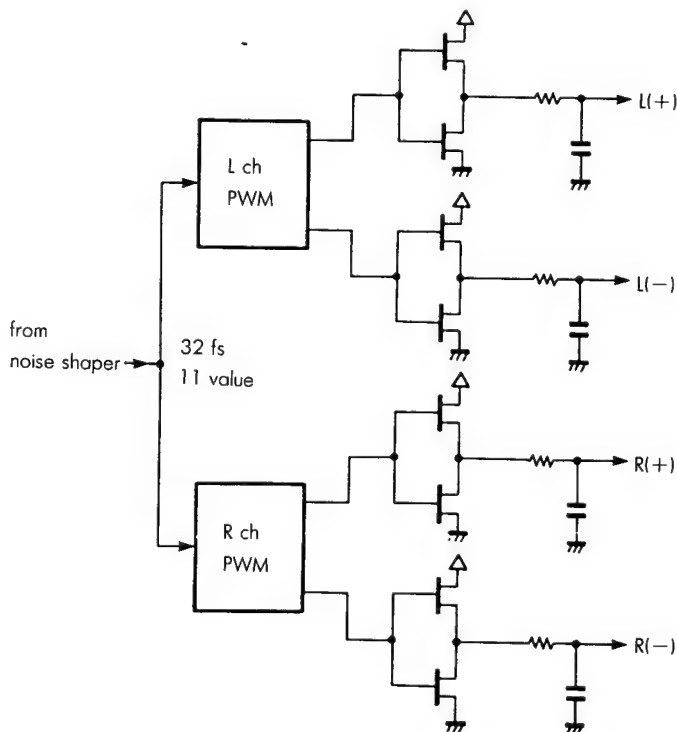


Fig. 18

8. Audio Circuit

Fig. 19 shows a block diagram of the audio circuit.

The outputs from Pin 14 (OUT L(+)) and Pin 11 OUT (-) pass through the 2-step LPF which consists of C702, R704 and R702 for one and C704 and R706 for the other, and the high frequency component of the PWM output from DAC is removed.

Then the (+) side component of the PWM is inputted directly, and its (-) side component through the inverted darlington buffer circuit consisting of Q704 and Q706 to the discrete circuit amplifier consisting of Q708, Q710, Q712 and Q714, where they are synthesized into an approximately 2V signal voltage which is then output to the LPF circuit of the next stage.

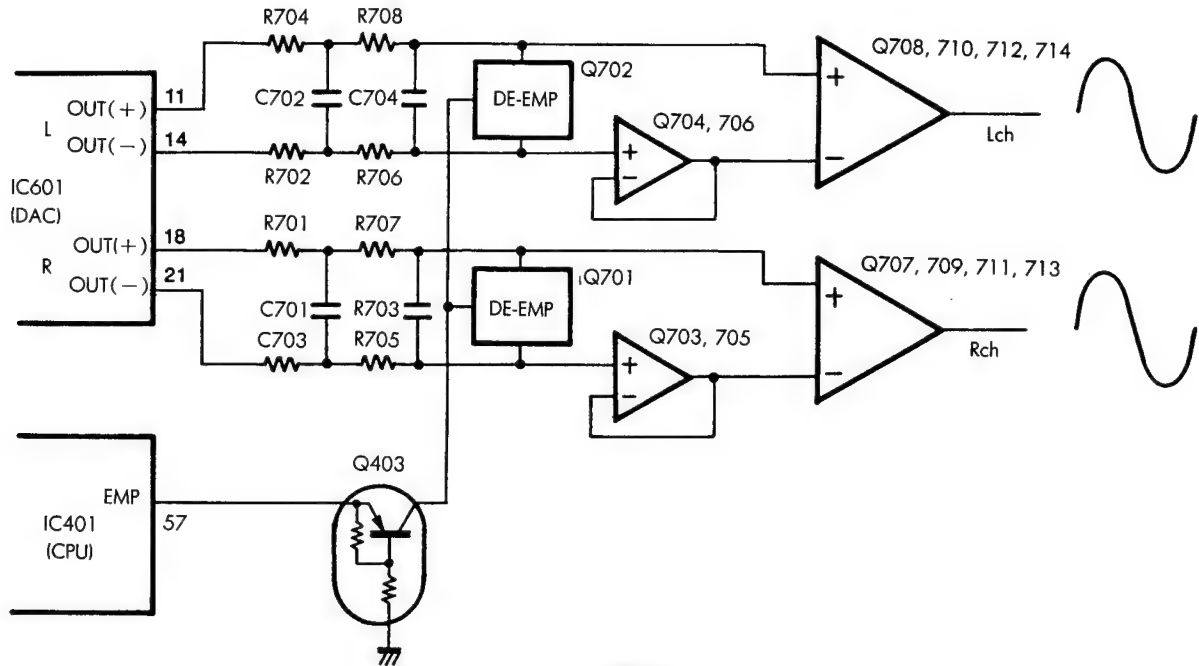


Fig. 19

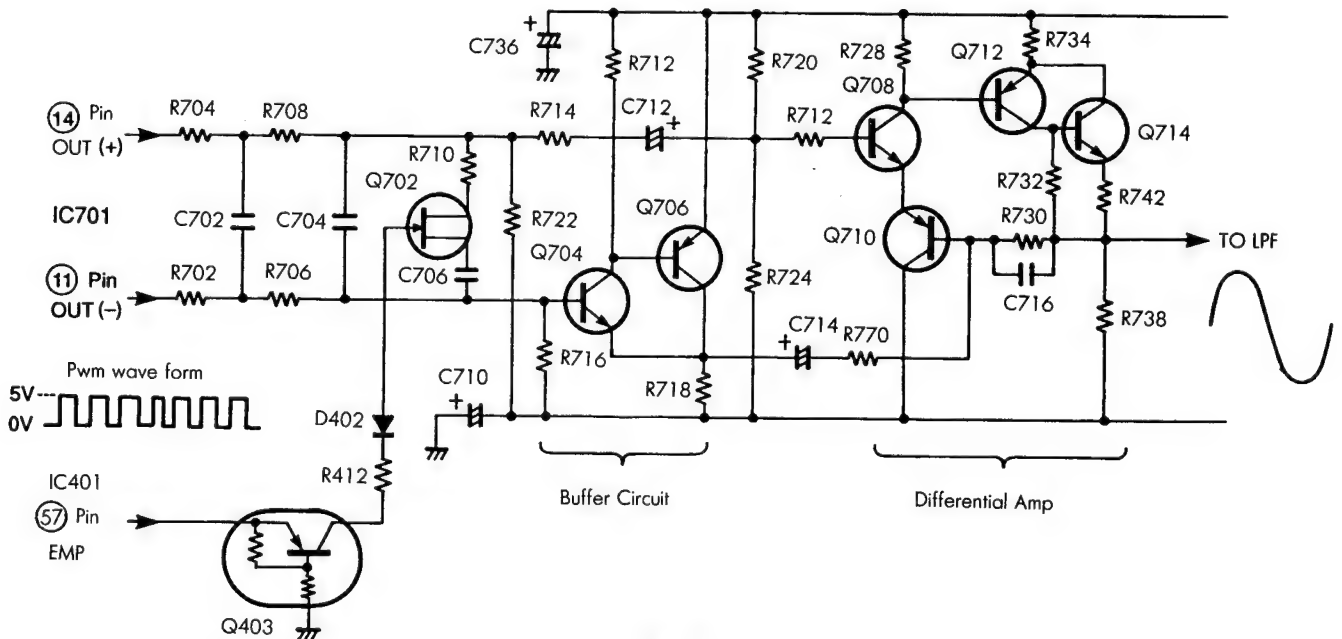


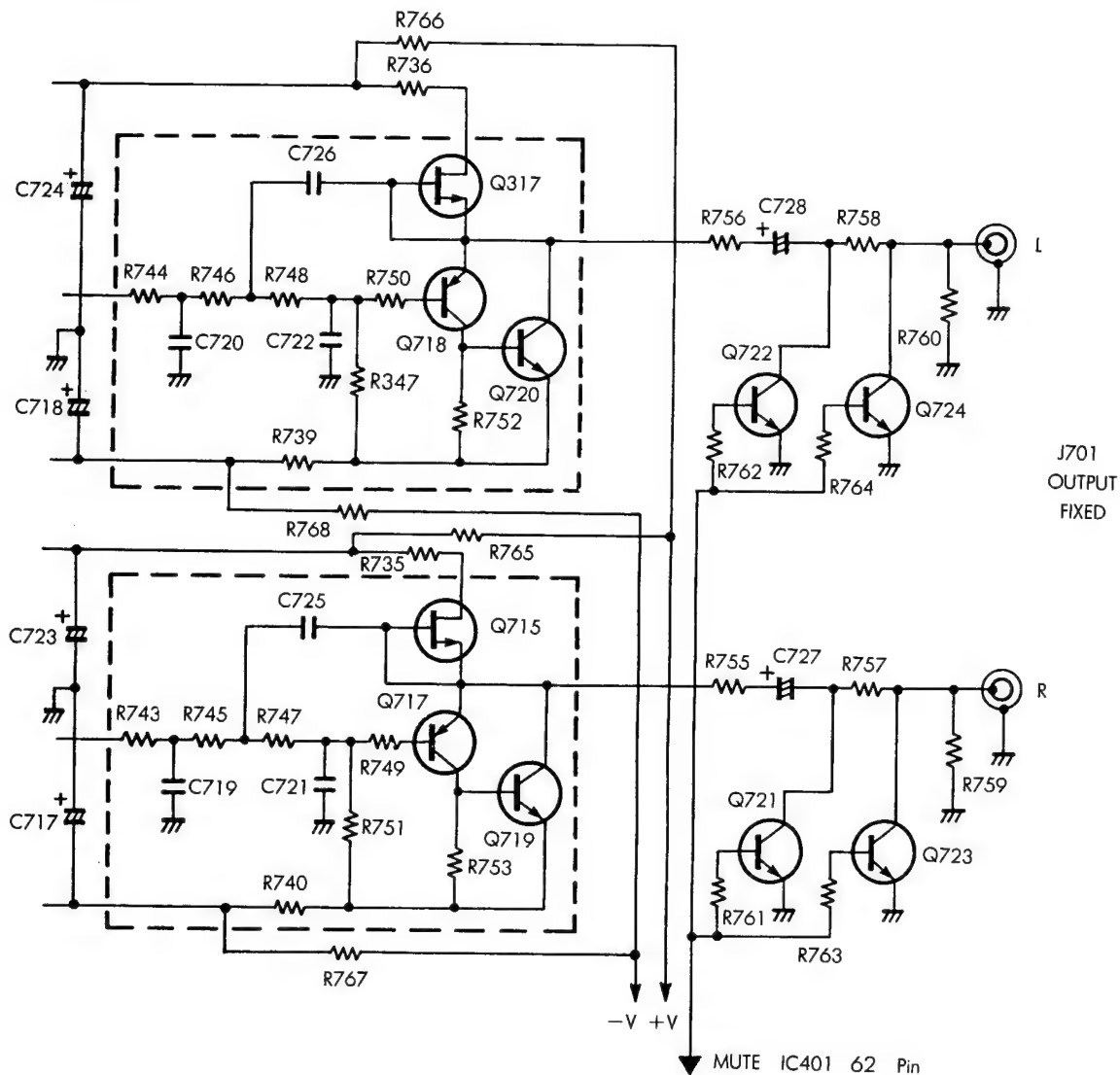
Fig. 20

The emphasis data from the disc is output through the terminal (Pin 57) of IC401. When a disc to which emphasis is applied is played back, this terminal is set high and Q403 turns ON. Following this, Q702 are also turned ON. Then connected C706 and R710 provides the DE-Emphasis characteristics. Fig. 20 shows the buffer circuit and the differential amplifier. (Right channel only)

9. Low-Pass filter

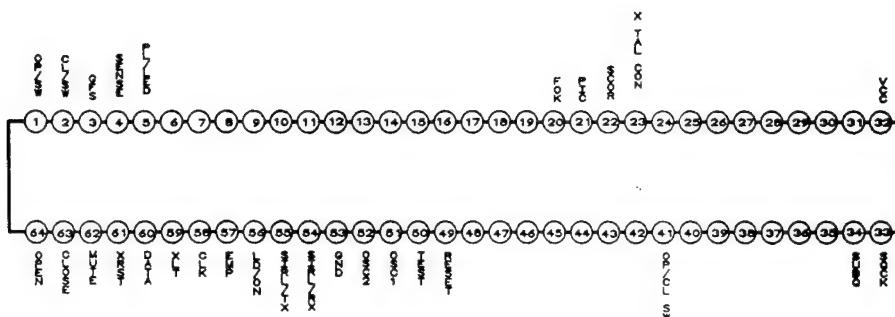
Fig. 21 shows a final-stage circuit which includes a low-pass filter and other elements.

The portion of Fig. 21 enclosed by the broken line is 3rd-order active LPF. This LPF causes noise in the high range to be cut. Q718 and Q720 (Left channel) and Q717 and Q719 (Right channel) are buffer circuit of inverted darlington configuration. Q716 and Q715 are FET controlled constant current circuits. Q725, Q726, Q722, Q721, Q723 and Q724 are power muting circuit.

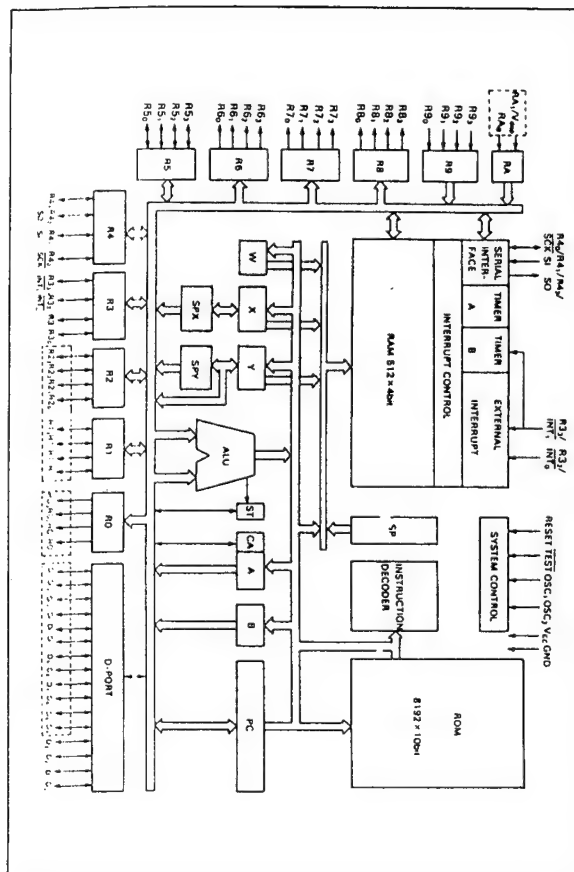


IC FUNCTIONAL BLOCK DIAGRAM

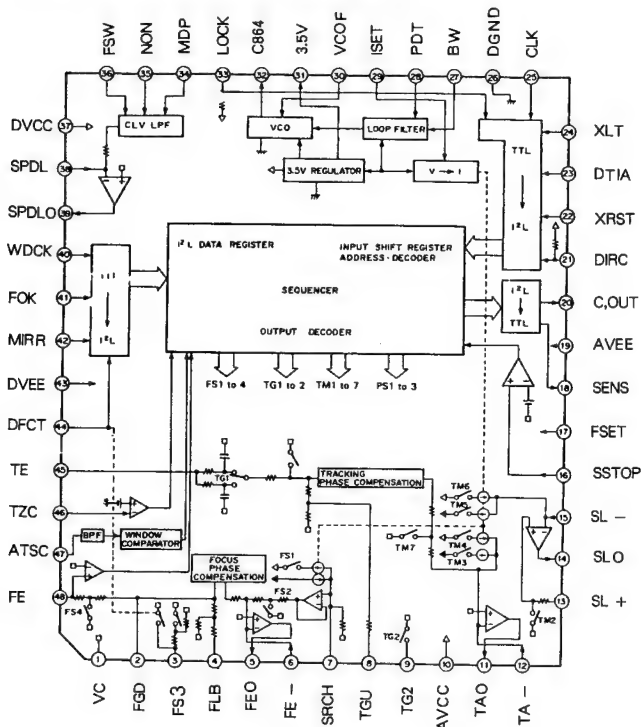
IC 401: MICRO COMPUTER LE1043(HMCS 408 AC)



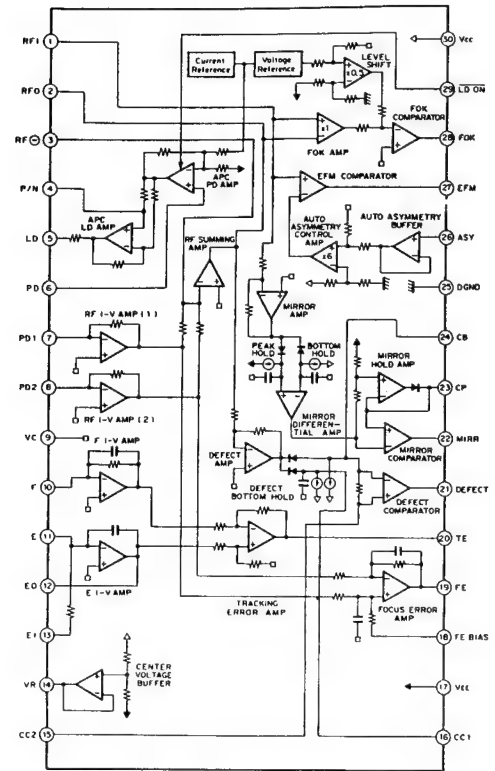
LE 1043		INPUT/	FUNCTION DESCRIPTION
TERMINAL	NO	OUTPUT	
OP/SW	1	INPUT	SWITCH INPUT INDICATING THAT TRAY IS OPEN"CON ACTIVE"
CL/SW	2	INPUT	SWITCH INPUT INDICATING THAT TRAY IS CLOSE"CON ACTIVE"
GFS	3	INPUT	IMPORT TERMINAL FOR REVOLUTION SYNCHRONOUS SIGNAL.
SENSE	4	INPUT	DETECTING SIGNAL FOR SERVO MODE.
PL/LED	5	OUTPUT	CONTROL OUTPUT FOR ON/OFF OF PLAY LED
N.C	6-19		UNUSED.
FOK	20	INPUT	INPUT TERMINAL FOR FOCUS SYNCHRONOUS SIGNAL.
PIC	21	INPUT	PIN FOR DETECTING A SIGNAL FOR THE ON/OFF LIMIT SWITCH OF THE PICK-UP.
SCOR	22	INPUT	SYNCHRONOUS SIGNAL INPUT OF SUB-CODE.
N.C	23		UNUSED.
X-TAL CON	24	OUTPUT	CONTROL OUTPUT FOR ON/OFF OF X-TAL (33.86MHz)
N.C	25-31		UNUSED.
VCC	32		POWER SUPPLY DC+5V.
SQCK	33	I/OUTPUT	CLOCK FOR READING SUB-CODE
SUBQ	34	INPUT	IMPORT TERMINAL FOR SUB-CODE DATA.
N.C	35-40		UNUSED.
OP/CL SW	41	INPUT	OPEN/CLOSE KEY INPUT TERMINAL.
N.C	42-48		UNUSED.
RESET	49	INPUT	C.P.U RESET INPUT.
TEST	50	INPUT	UNUSED, CONNECT TO VCC.
OSC1	51	INPUT	SYSYEM CLOCK OSCILLATOR.FCLK = 3.0MHz
OSC2	52	OUTPUT	
GND	53	INPUT	GROUNDING TERMINAL.
SRL/RX/TX	54	I/OUTPUT	CONTROL SIGNAL IN/OUTPUT OF SYSTEM.
BUSY	55	I/OUTPUT	
LD/ON	56	OUTPUT	CONTROL OUTPUT FOR ON/OFF LASERDIODE."LOW ACTIVE"
EMP	57	OUTPUT	EMPHASSIS DETECT.
CLK	58	OUTPUT	OUTPUT TERMINAL OF SIGNAL TRANSFER CLOCK FOR SERVO CONTROL SIGNAL.
XLT	59	OUTPUT	OUTPUT TERMINAL OF LATCH FOR SERVO SYNCHRONOUS SIGNAL.



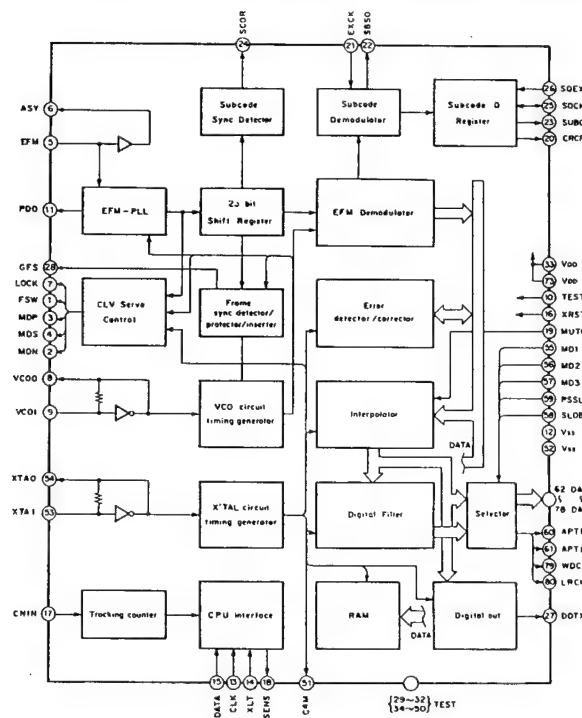
IC 201: C X A 1082 B Q OPTICAL PICK-UP SERVO CONTROL



IC 101: C X A 1081 S RF AMP

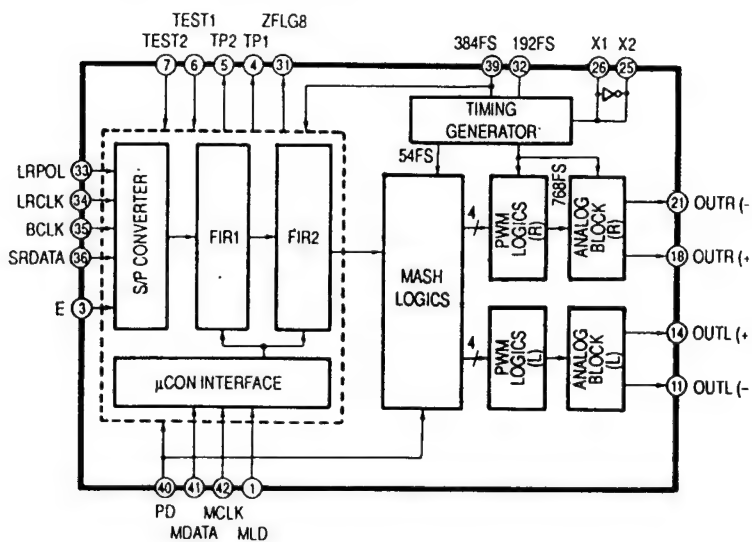


IC 301: C X D 1167 Q DIGITAL SIGNAL PROCESSOR AND DYNAMIC RAM

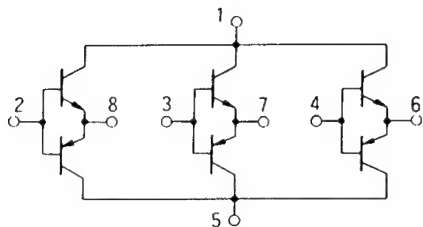


Note) These pins are for the QFP. For VOFP they are different. See Pin Description.

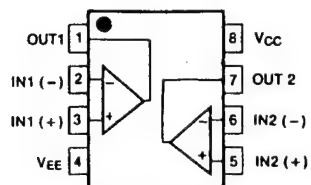
IC 601: MN 6471 M DIGITAL FILTER & D/A CONVERTER



IC 202: STA 341 M TR ARRAY

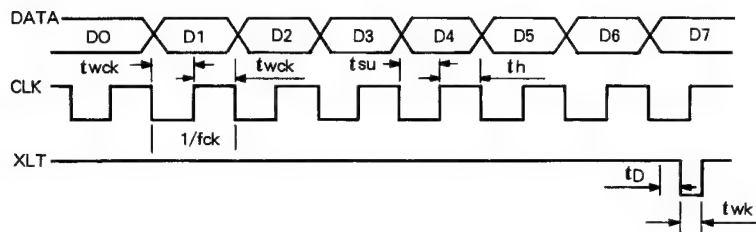


IC 402: MC 4558 C 2-CH OP-AMP



TIMING CHART

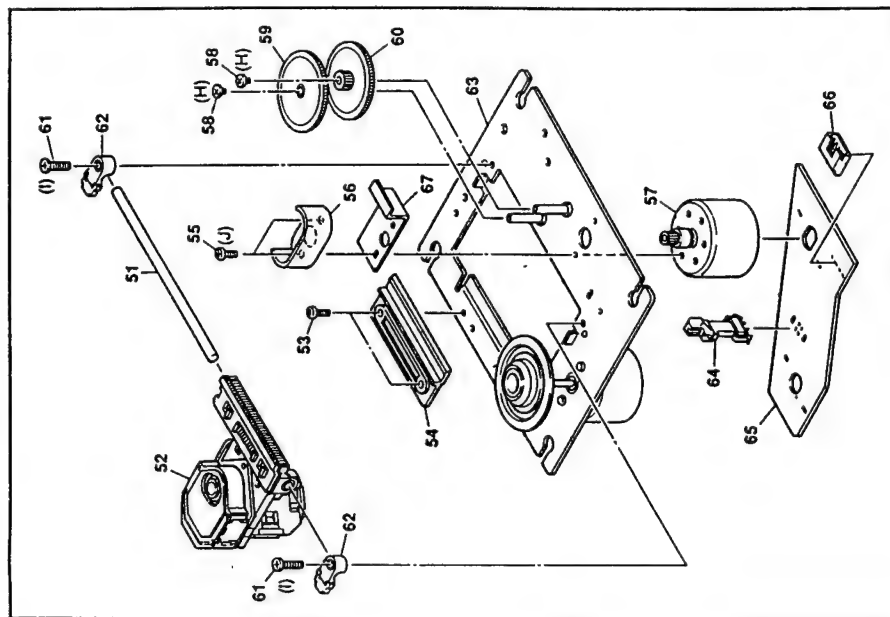
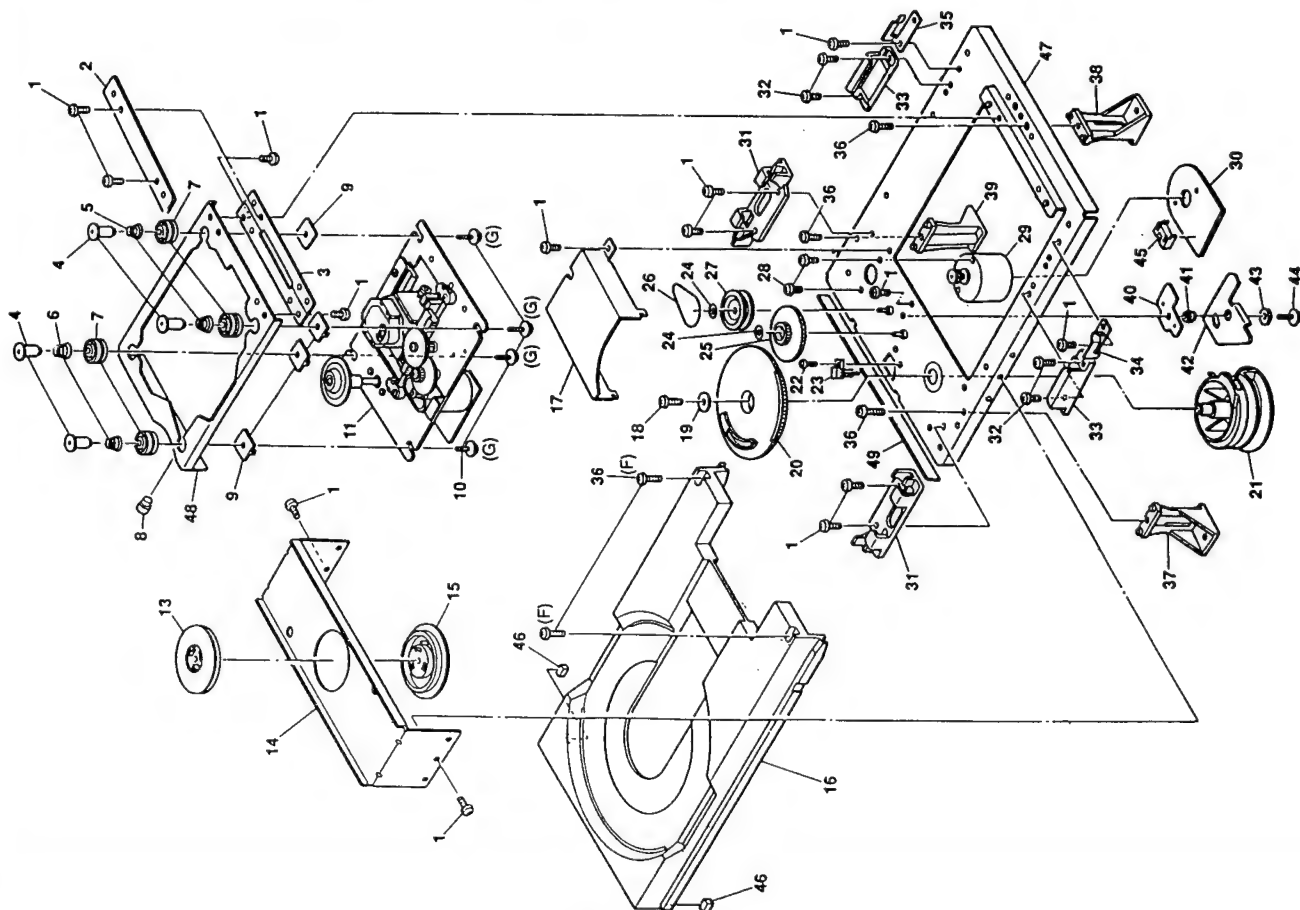
CDP : CD-300/500



V_{cc} 5.0 V

Item	Symbol	Unit
Clock frequency	f_{ck}	MHz
Clock pulse width	t_{wck}	ns
Hold time	t_{su}	ns
Setup time	t_h	ns
Delay time	t_D	ns
Latch pulse width	t_{WL}	ns

CD MECHANISM EXPLODED VIEW

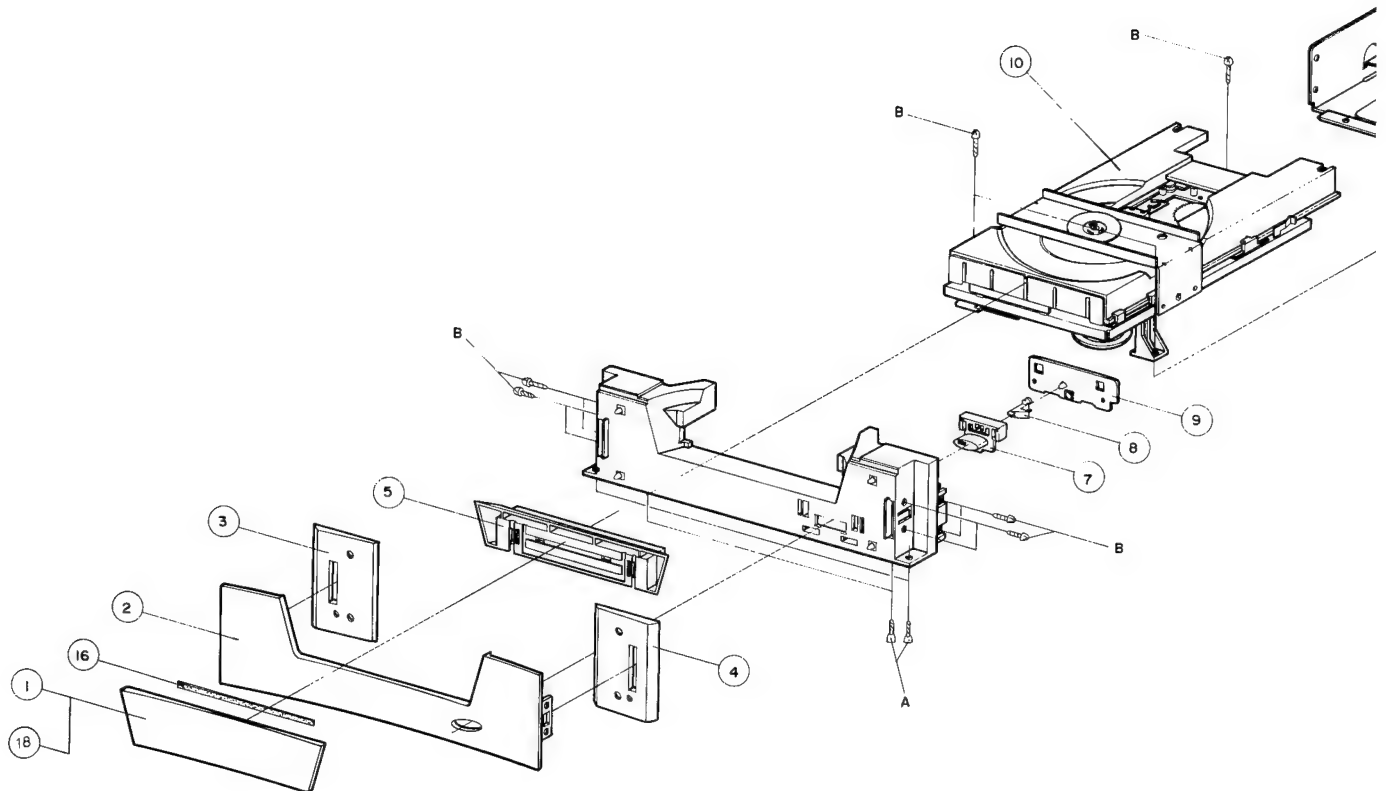


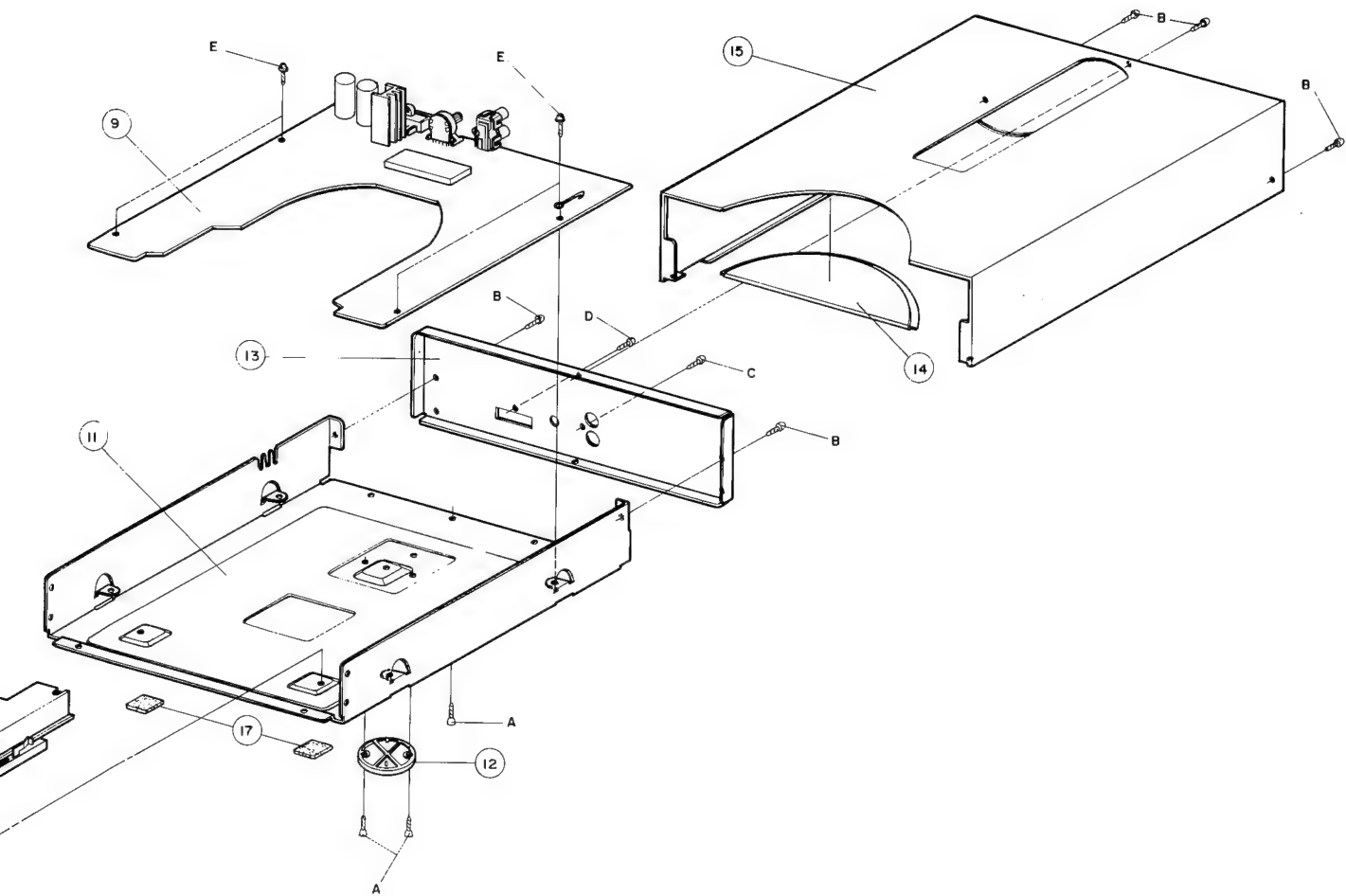
PARTS LIST

Part No.	Description
1	SCREW (M2.5x6mm)
2	WEDGE HOLDER
3	WEDGE
4	SHAFT
5	COIL SPRING (B)
6	COIL SPRING (A)
7	INSULATOR (C)
8	ROLLER
9	PLATE (I)
10	SCREW
11	CD PLAYER SUB UNIT ASSY
12	MAGNET ASSY
13	CHUCK CHASSIS
14	CHUCKING PULLEY
15	TRAY
16	GEAR COVER
17	SCREW (M2.5x10mm)
18	WASHER
19	DRIVE GEAR
20	CONTROL CAM
21	SCREW (M2.5x10mm)
22	LEAF SWITCH
23	LOCK WASHER
24	CENTER GEAR
25	LM BELT
26	LOADING PULLEY
27	SCREW (M2.5x10mm)
28	MOTOR ASSY
29	MOTOR P.C. BOARD
30	TRAY HOLDER FRONT
31	SCREW (M2.5x10mm)
32	TRAY HOLDER REAR
33	TRAY GUIDE, RIGHT
34	SCREW (M2.5x10mm)
35	TRAY GUIDE, LEFT
36	SCREW (M2.5x10mm)
37	HOLDER, RIGHT
38	HOLDER, LEFT
39	LINK PLATE
40	BOSS
41	STOPPER LINK ASSY
42	SPACER
43	SCREW (M2.5x10mm)
44	CONNECTOR, 5 PIN
45	DAMPER
46	MAIN CHASSIS ASSY
47	SUB CHASSIS ASSY
48	FRONT TAPE
49	SLIDE SHAFT
50	PICK-UP ASSY
51	SPECIAL SCREW (2x5mm)
52	SLIDE HOLDER
53	SCREW (M2.5x10mm)
54	GEAR COVER
55	SLIDE MOTOR ASSY
56	SPECIAL SCREW (M1.7x3mm)
57	GEAR (A)
58	GEAR (B)
59	SCREW (M2.5x10mm)
60	SHAFT CLAMP
61	DISC MOTOR ASSY
62	LEAF SWITCH
63	MOTOR P.C. BOARD
64	CONNECTOR, 4 PIN
65	STOPPER
66	STOPPER

EXPLODED VIEW

CDP : CD-300/500





NOTE: A=(USA), B=(I,B,BB)

NO	PARTS NAME	PARTS NO	MATERIAL	Q'TY	REMARK
1	DOOR .COVER	3-821-102-01	A6063-T5	1	A,B
2	PANEL . FRONT	3-819-802-01	A6063-T5	1	A,B
3	FOOT (L)	3-819-806-02	A6063-T5	1	A,B
4	FOOT (R)	3-819-807-01	A6063-T5	1	A,B
5	HOLDER . DOOR	3-819-805-04	ABS-720	1	A,B
6	PANEL . BASE	3-819-803-05	ABS-720	1	A,B
7	KNOB . TACT	3-819-804-01	ABS-720	1	A,B
8	LENS .KNOB	3-324-012-02	SBR (K-RESIN)	1	A,B
9	PCB . UNIT ASS'Y	A-170-856-02	MAIN	1	A,B
10	MECHANISM . CDP	2-219-116-01	SONY. MECHANISM	1	A,B
11	CHASSIS . MAIN	3-819-808-05	SECC T1.0	1	A,B
12	FOOT .REAR	3-324-011-01	ABS-720	1	A,B
13	PANEL .REAR	3-819-810-21	SECC T0.8	1	A,B
14	WINDOW . MECHA.	3-819-812-02	PMMA-60N	1	A,B
15	TOP . COVER	3-819-809-01	SECC T0.8 (SPRAY)	1	A,B
16	CUSHION . DOOR	3-819-815-03	FELT + TAPE (T0.5)	1	A,B
17	COVER . SCREW	3-819-816-01	EVA GRAY T5.5	2	A,B
18	DOOR . COVER(CD500)	3-821-002-01	A6063-T5	1	A,B
A	SCREW	7-464-408-01	CBZ 30P080FZK	9	A,B
B	SCREW	7-764-408-01	VBZ 30P080FZK	11	A,B
C	SCREW	7-999-166-01	PBT 30P100FZK	1	A,B
D	SCREW	7-764-410-01	VBZ 30P100FZK	1	A,B
E	SCREW	7-344-408-01	ATZ 30P080FZK	4	A,B

ELECTRICAL PARTS LIST

CDP : CD-300/500

REF. No

Part No.

Description

PCB-1 MAIN P.C. BOARD

RESISTORS

R505, 506
R733, 734, 735, 736, 739, 740, 741, 742
R507, 765, 766, 767, 768
R602
R105
R757, 758
R601, 749, 750, 755, 756
R405, 727, 728
R307, 725, 726
R303, 304, 305, 501, 502, 737, 738
R743, 744, 753, 754
R110, 111, 411, 503, 504, 604, 605, 711, 712, 717
718, 731, 732, 745, 746, 747, 748, 420, 421
R772, 773
R214, 404, 713, 714
R101, 774, 775
R106, 107, 415, 603
R769, 770
R206
R103, 109, 210, 211, 212, 302, 701, 702, 703
704, 705, 706, 707, 708, 729, 730
R709, 710
R403, 761, 762, 763, 764
R102
R104, 204, 216
R411, 406, 416
R402, 721, 722
R751, 752
R201, 715, 716
R108, 202, 207, 209, 301, 407, 408, 719, 720
759, 760
R203, 205, 213, 409, 410
R414
R723, 724
R208
R219, 401, 412, 413

111510925 1Ω 1/2W, ±5%
111822925 2.2Ω 1/8W, ±5%
111847925 4.7Ω 1/8W, ±5%
111810025 10Ω 1/8W, ±5%
111822025 22Ω 1/8W, ±5%
111847025 47Ω 1/8W, ±5%
111810125 100Ω 1/8W, ±5%
111822125 220Ω 1/8W, ±5%
111833125 330Ω 1/8W, ±5%
111847125 470Ω 1/8W, ±5%
111856125 560Ω 1/8W, ±5%
111810225 1KΩ 1/8W, ±5%

111812225 1.2KΩ 1/8W, ±5%
111822225 2.2KΩ 1/8W, ±5%
111839225 3.9KΩ 1/8W, ±5%
111847225 4.7KΩ 1/8W, ±5%
111868225 6.8KΩ 1/8W, ±5%
111882225 8.2KΩ 1/8W, ±5%
111810325 10KΩ 1/8W, ±5%

111812325 12KΩ 1/8W, ±5%
111815325 15KΩ 1/8W, ±5%
111818325 18KΩ 1/8W, ±5%
111822325 22KΩ 1/8W, ±5%
111847325 47KΩ 1/8W, ±5%
111868325 68KΩ 1/8W, ±5%
111875325 75KΩ 1/8W, ±5%
111882325 82KΩ 1/8W, ±5%
111810425 100KΩ 1/8W, ±5%

111812425 120KΩ 1/8W, ±5%
111815425 150KΩ 1/8W, ±5%
111818425 180KΩ 1/8W, ±5%
111851425 510KΩ 1/8W, ±5%
111810525 1MΩ 1/8W, ±5%

CONTROLS

VR701
VR101, 103, 104
VR102
VR201

250139301 20KB X 2 RK16K1250101-20KB
251222301 6MMIRH0615C1, 22K
251247301 6MMIRH0615C1, 47K
251222201 6MMIRH0615C1, 2.2K

CAPACITORS

C715, 716
C703, 704
C701, 702
C711, 712
C713, 714
C601, 602, 603, 604, 605, 606
C717, 718, 723, 724, 727, 728
C706, 707, 708, 709
C607, 608
C401, 402
C102
C106, 112, 210, 301, 303, 404, 609
C103
C705, 706, 719, 720, 721, 722
C101
C116, 117, 211
C725, 726
C108, 111, 207, 208, 215

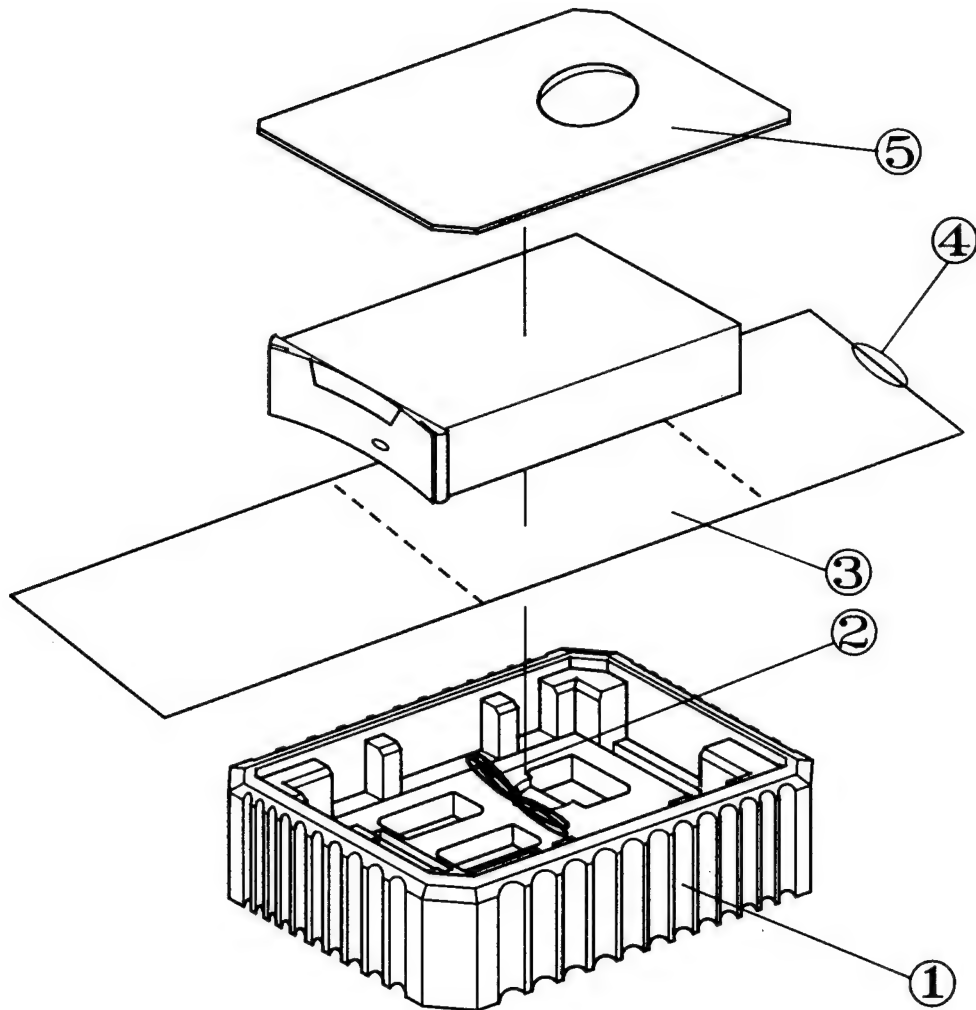
19Y610011 10pF, ±5%, 50V, MICA
19Y633041 33pF, ±5%, 50V, MICA
19Y682041 82pF, ±5%, 50V, MICA
194310065 10μF, ±20%, 16V, AH ELEC
194233065 33μF, ±20%, 10V, AH ELEC
194247065 47μF, ±20%, 10V, AH ELEC
194210167 100μF, ±20%, 10V, AH ELEC
194222167 220μF, ±20%, 10V, AH ELEC
180605015 5pF, CH, 50V, ±5%, CERAMIC
180610015 10pF, CH, 50V, ±5%, CERAMIC
180612045 12pF, CH, 50V, ±5%, CERAMIC
175647345 47000pF, F, 50V, ±5%, CERAMIC
150610245 1000pF, 50V, ±5%, MYLAR
150615245 1500pF, 50V, ±5%, MYLAR
150622245 2200pF, 50V, ±5%, MYLAR
150647245 4700pF, 50V, ±5%, MYLAR
150656245 5600pF, 50V, ±5%, MYLAR
150610345 10000pF, 50V, ±5%, MYLAR

REF. No	Part No.	Description
C105, 109, 216	150633345	33000pF, 50V, ±5%, MYLAR
C202	150647345	47000pF, 50V, ±5%, MYLAR
C201, 204, 501, 502,	150610445	100000pF ± 50V, ±5%, MYLAR
C110, 217	141647865	0.47μF, ±20%, 50V, ELEC
C212, 213, 403	141601065	1μF, ±20%, 50V, ELEC
C203, 403	141647965	4.7μF, ±20%, 50V, ELEC
C206	141610065	10μF, ±20%, 50V, ELEC
C104, 107, 113, 114, 115, 205, 209, 214, 219	141247065	47μF, ±20%, 10V, ELEC
302, 304, 405		
△ C505, 506	141322165	220μF, ±20%, 16V, ELEC
△ C507, 508	141210267	1000μF, ±20%, 10V, ELEC
△ C503, 504	141347267	4700μF, ±20%, 16V, ELEC
C406	144622965	2.2μF, ±20%, 50V, ELEC
IC101	2440418741	CXA-1081SIDIP TYPEI
IC201	2440408741	CXA-1082BQ
IC301	2440423741	CXD-1167Q, DSP+SRAM
IC401	2600103011	ZTAT, HD4074008S
	OR 2600153021	LE1043, HMCS408AC
IC601	2441437511	MN6471M
IC202	2442026791	STA341M
IC402	244123671	MC4558C
Q501, 502, 701, 702, 715, 716	2404111351	2SK24GR F.E.T
△ Q503	240111221	KT81366
△ Q504	240215321	KTD2058
Q505, 507, 703, 704, 707, 708, 713, 714,	240218035	2SC1571G
719, 720		
Q506, 508, 705, 706, 709, 710, 711, 712	240015735	2SA929G
717, 718		
Q201, 403, 602	240211125	KTC3198Y
Q402	240211425	KTC3203Y
Q101, 202, 401	240010825	KTA1271Y
Q203	240215215	MPSA25IDARINGTONI
Q725	240610715	KSR2001
Q726	240610915	KSR1003
Q601	240610615	KRA103M
Q721, 722, 723, 724	240215415	KTC2878A
△ D501, 502, 503, 504	2413581651	1N4003L
D101, 402, 403	241017995	1SS133
△ D505, 506	242106245	ZENER 1N73A 6.2V
X401	213816601	6MHZ, X-TAL(401:HD4074008S)
	OR 213816701	3MHZ, X-TAL(401:LE1043, HMCS408AC)
X601	213818101	33.8688MHZ(3RD)
WA101, 301, 302	216812101	2.5M/M, 2P, NKCO21
WA104, 403	216812401	2.5M/M, 5P, NICC-024-0
WA102	216842401	STRAIGHT TYPE, 8P, 2M/M
WA401, 402	216810101	2P, 2MM
WA201	216836001	00-8283-0412-0000 4P, 2M/M
WA103	216844501	4P, 2M/M, RED
WA202	216844601	4P, 2M/M, YELLOW
WA501	216846901	13P, 52303-1311, BLACK
CN401, 402	215997901	2P, 2M/M, 350M/M
L101	103410035	10UH, AL03(7MM) ±10%
HS501	371070203	40MM, AL
JAC701	215561701	GOLD WHITE. RED, P:14
PCB-2 CONTROL P.C. BOARD		
R406	111833125	330Ω 1/8W, ±5%
D401	241949345	R34MC F02, F=4MM
SW401	220899901	177-620-002-000, KHH-10910

REF. No	Part No.	Description
PCB-4 SUB P.C. BOARD		
INTEGRATED CIRCUITS		
IC1	2600151011	LE1041 MSM6551 1RS CPU
IC2	2440323631	BA6238A MOTOR DRIVER
IC3	2440324631	BA10393
TRANSISTORS		
Q15, 16	240210925	KTC1627A-Y, PA
Q17	240215215	MPSA26, DARINGTDN
Q22, 23	240211135	KTC3198GR
CONTROLS		
VR1	2514203011	20KB EVNDCAA03B24
RESISTORS		
R33, 43	111415225	1.5K Ω , $\frac{1}{4}$ W, $\pm 5\%$
R84, 85	111810225	1K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R42	111847125	470 Ω , $\frac{1}{8}$ W, $\pm 5\%$
R15, 16, 17, 24, 25, 43	111810325	10K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R18	111822325	22K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R19, 37, 48, 49, 50, 51, 52, 53, 54, 55 56, 57, 75, 77, 78	111847325	47K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R40	111822125	220 Ω , $\frac{1}{8}$ W, $\pm 5\%$
R26	111410025	10 Ω , $\frac{1}{4}$ W, $\pm 5\%$
R28, 29, 30	111418225	1.8K Ω , $\frac{1}{4}$ W, $\pm 5\%$
R31	111433225	3.3K Ω , $\frac{1}{4}$ W, $\pm 5\%$
R32	111439225	3.9K Ω , $\frac{1}{4}$ W, $\pm 5\%$
R35, 36	111447025	47 Ω , $\frac{1}{4}$ W, $\pm 5\%$
R39	111822425	220K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R68	111868325	68K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R41	111847225	4.7K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R44	111810525	1M Ω , $\frac{1}{8}$ W, $\pm 5\%$
R45, 46	111812325	12K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R59, 60, 61, 72, 73	111810425	100K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R63, 64, 67	111822225	2.2K Ω , $\frac{1}{8}$ W, $\pm 5\%$
R65, 66, 68	111833325	33K Ω , $\frac{1}{8}$ W, $\pm 5\%$
CAPACITORS		
C15, 16, 17	175647395	47000pF, $\pm 20\%$, 50V
C18, 20	175610395	10000pF, $\pm 20\%$, 50V
C22	175610495	100000pF, $\pm 20\%$, 50V
C55	175610395	10000pF, $\pm 20\%$, 50V
MISCELLANEOUS		
CN109	2168456011	SBRK16S-1 16P
WA110	2168392011	52257-1110, 11P,
WA112, 114	2168389011	52257-0510, 5P,
WA111, 113	2168394011	52257-1510, 15P,
X1	2138185011	FCR4.0, MCT3, CERAMIC OSC

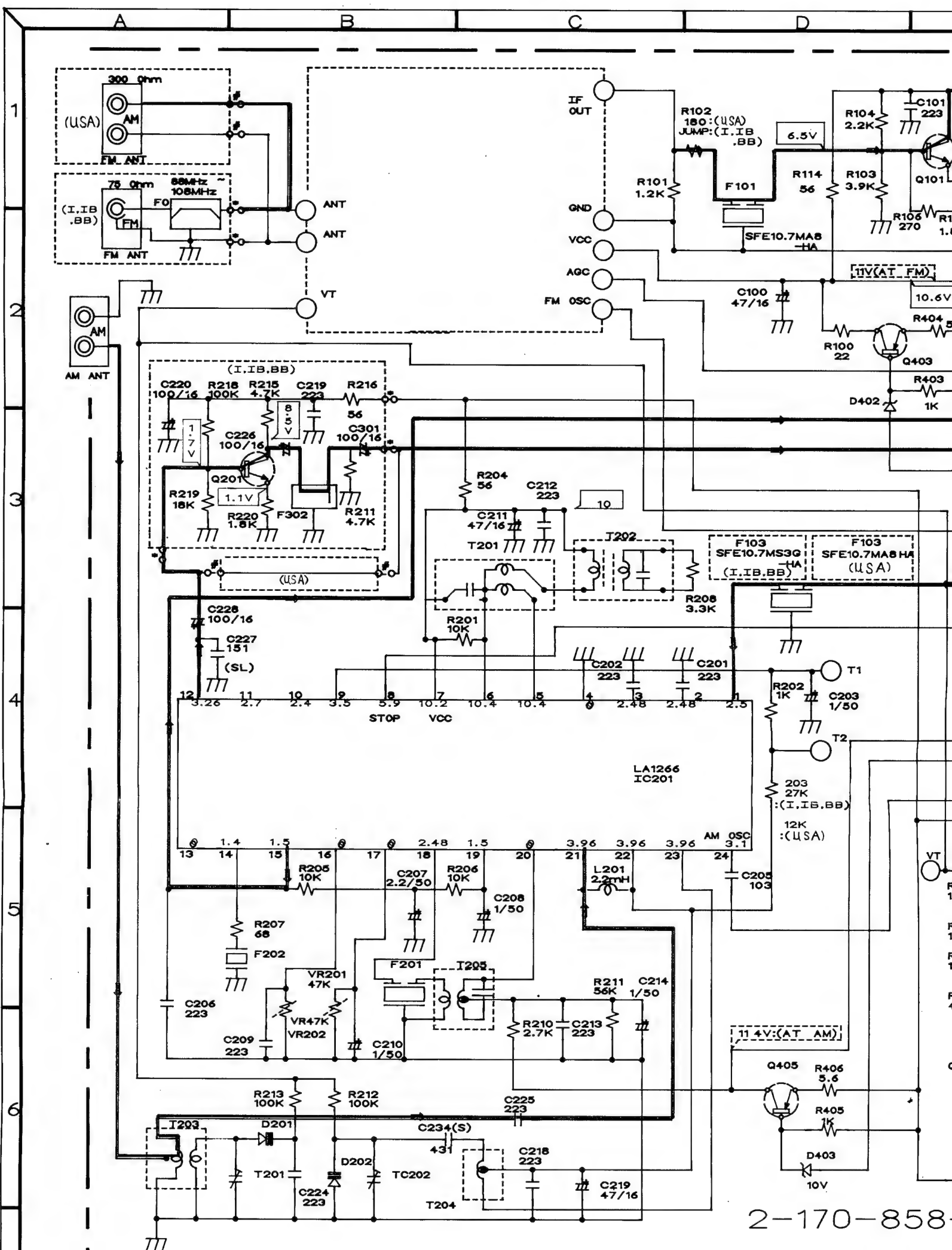
PACKING DRAWING

CDP : CD-300/500

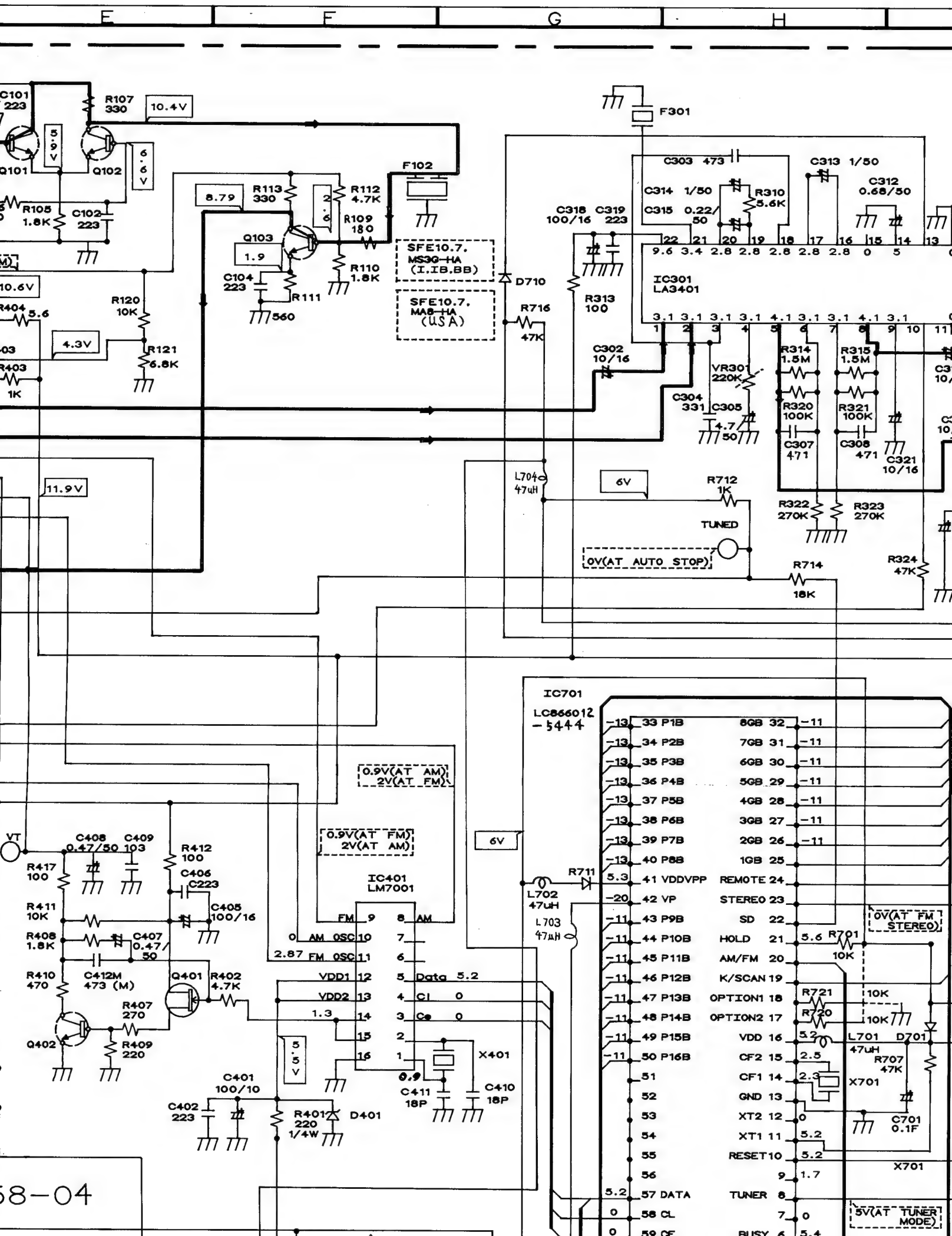


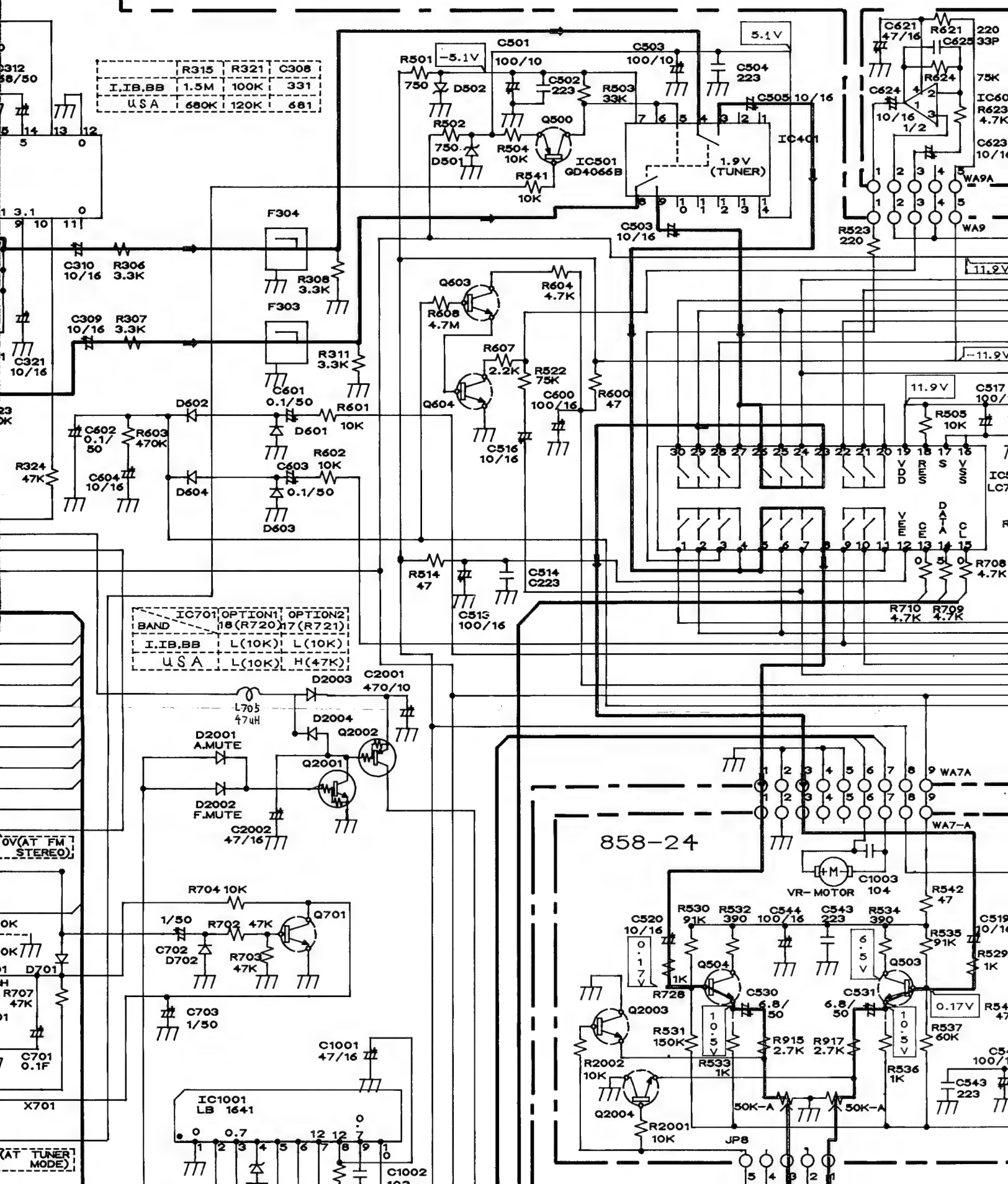
NO	PARTS NAME	PARTS NO.	Q'TY
1	PAD BOTTOM	3-819-811-01	1
2	PIN CORD	2-212-140-01	1
3	SHEET POLY	3-324-029-01	1
4	STICKER SET	3-819-817-01	1
5	INNER LID	3-324-019-01	1

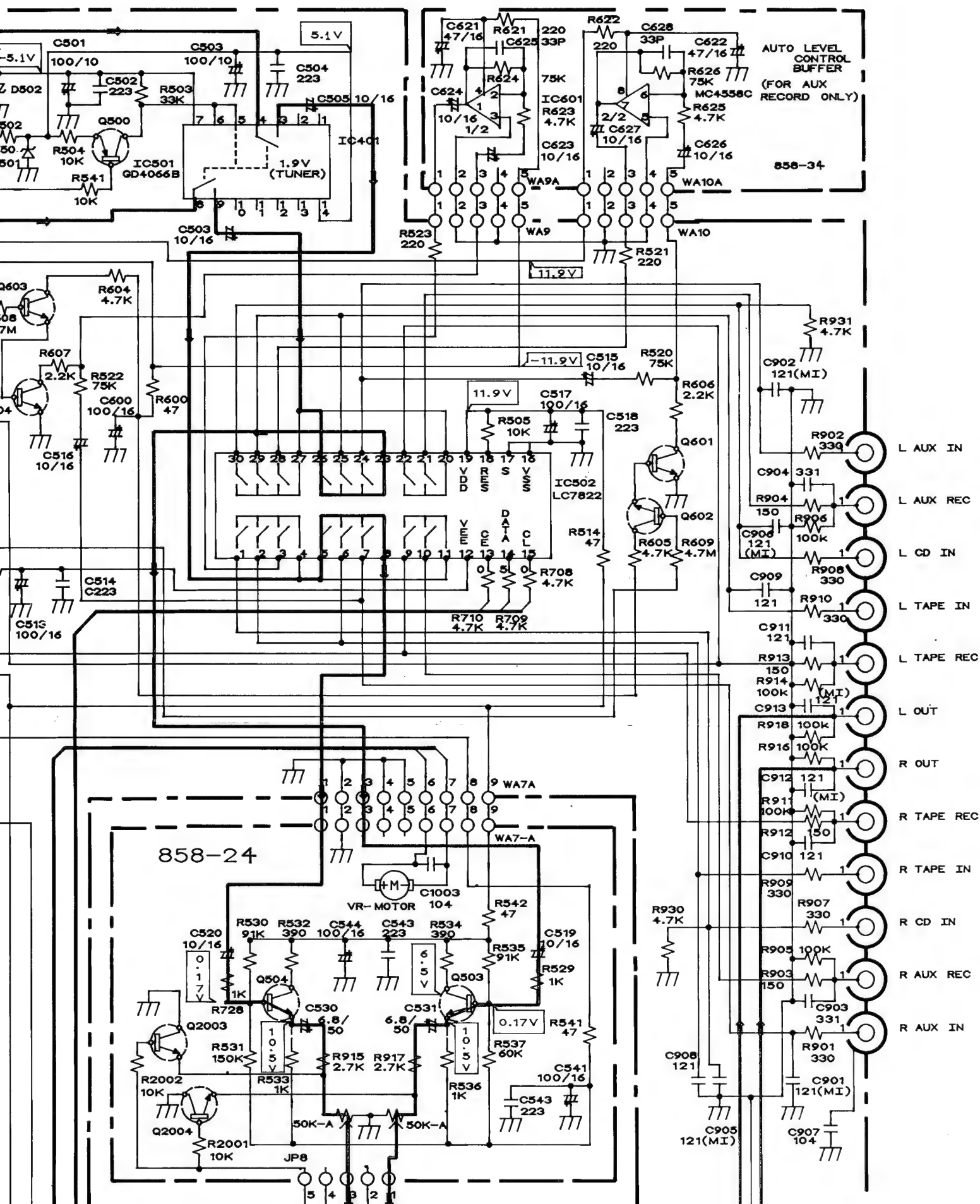
SCHEMATIC DIAGRAM (TUNER)



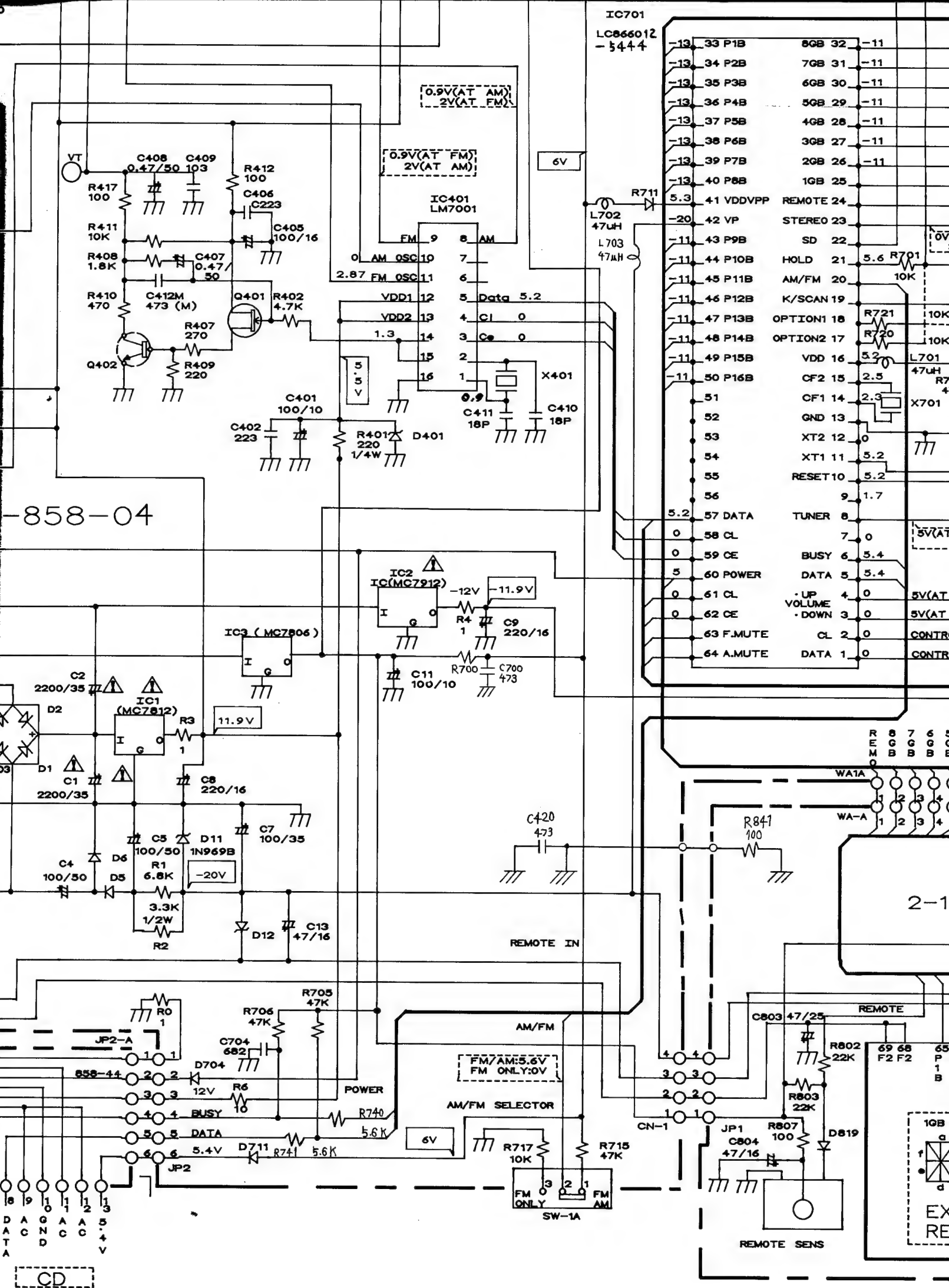
2-170-858

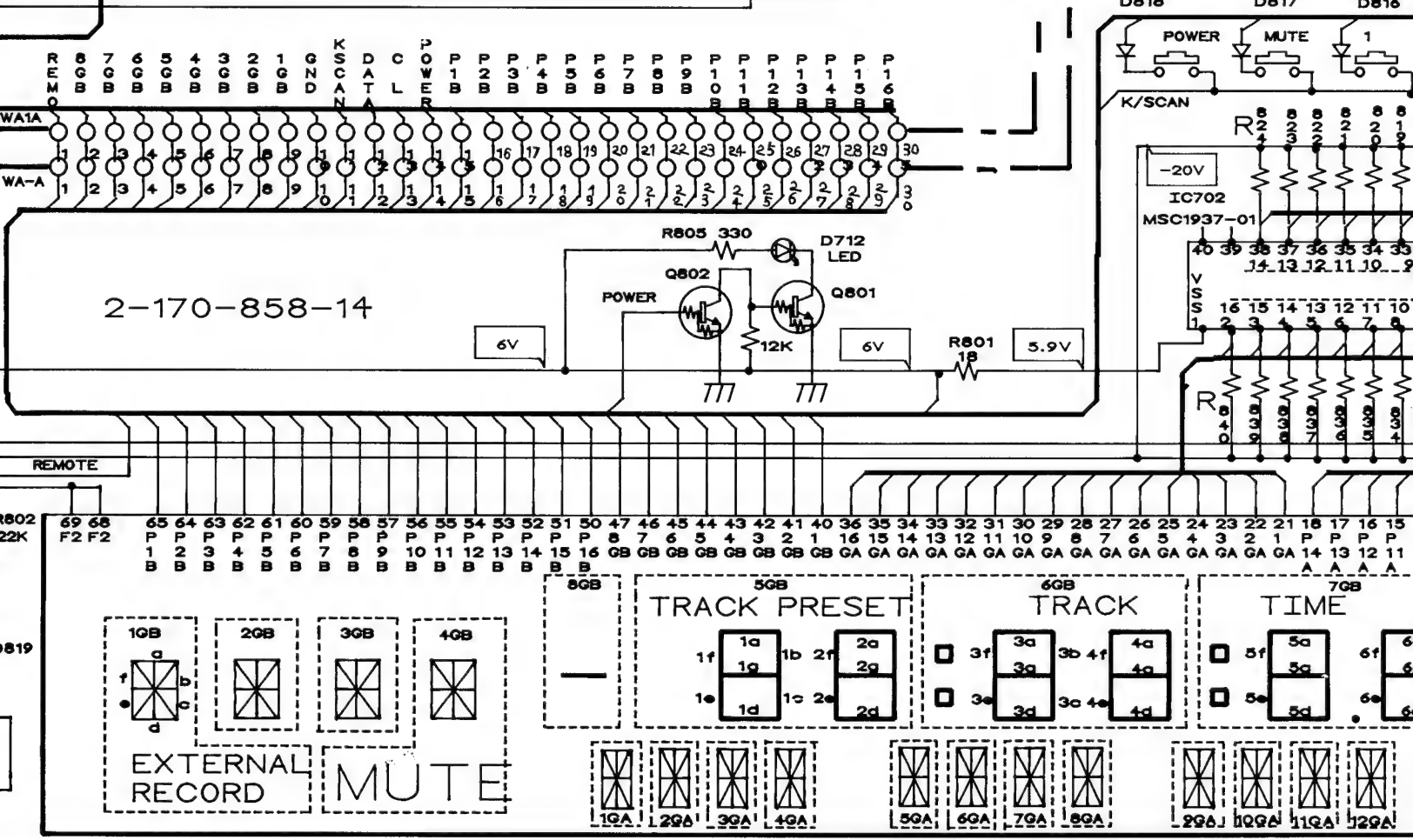
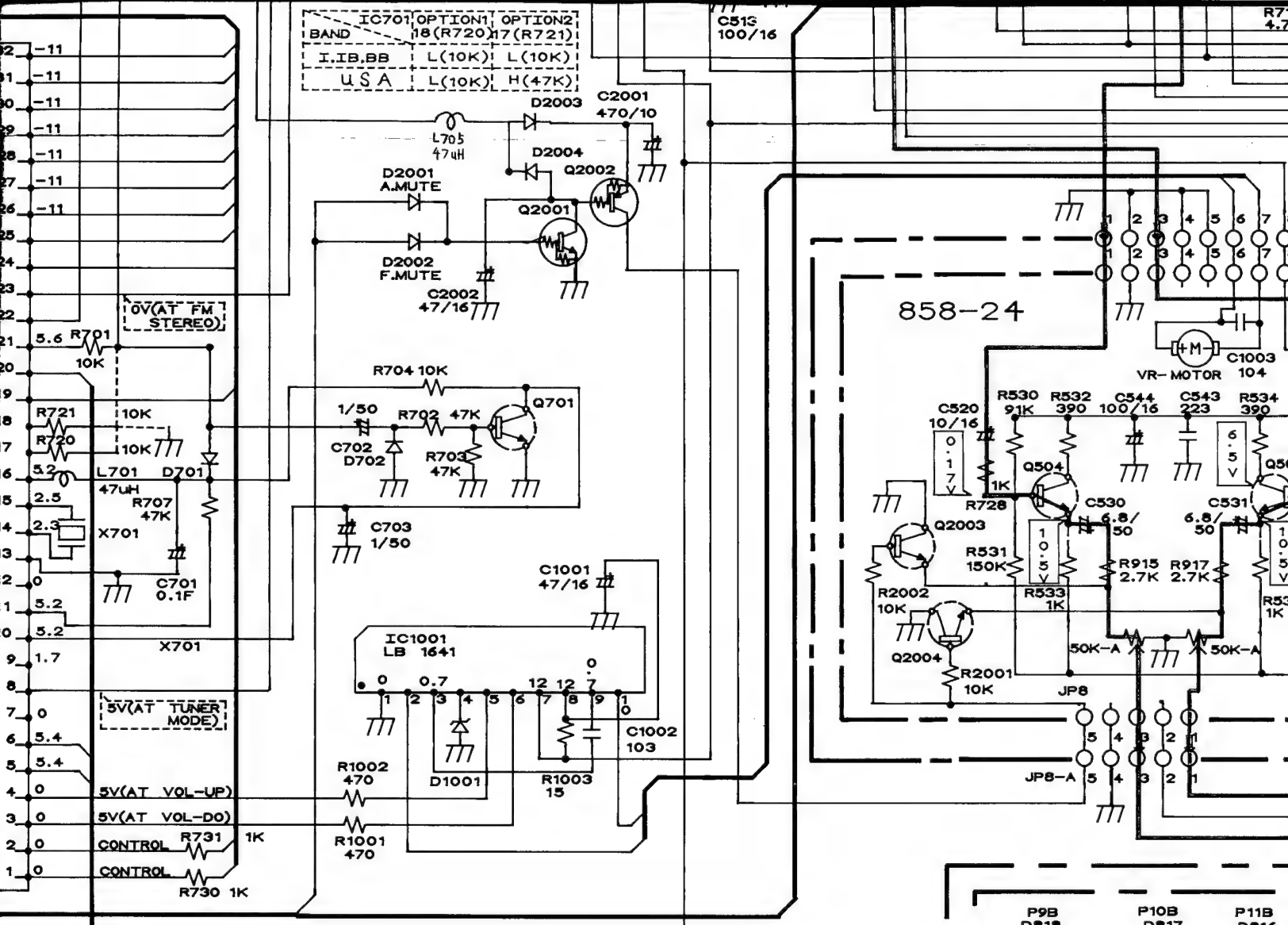


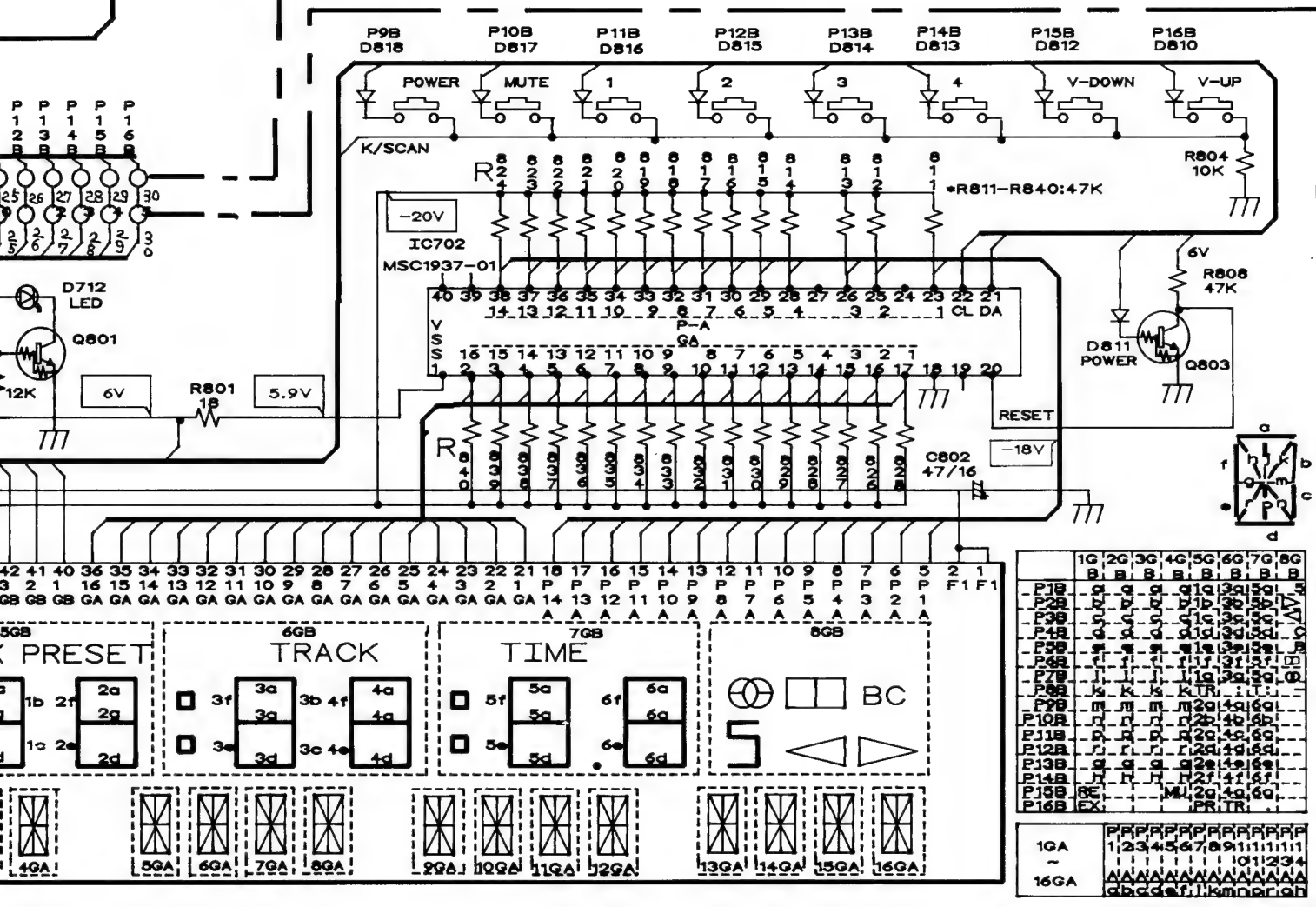












Tuner

USA

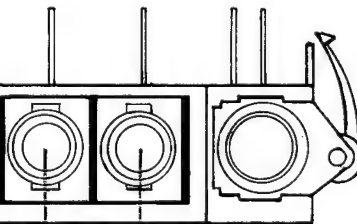
AM
FM

(300 Ω)

FM

(75 Ω)

R UNIT ASSY

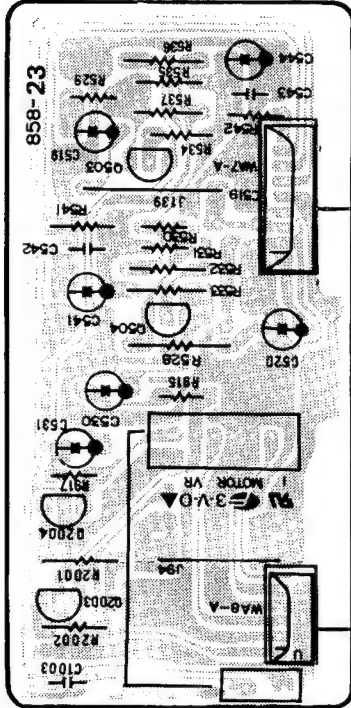


AM LOOP
ANTENNA ASSY

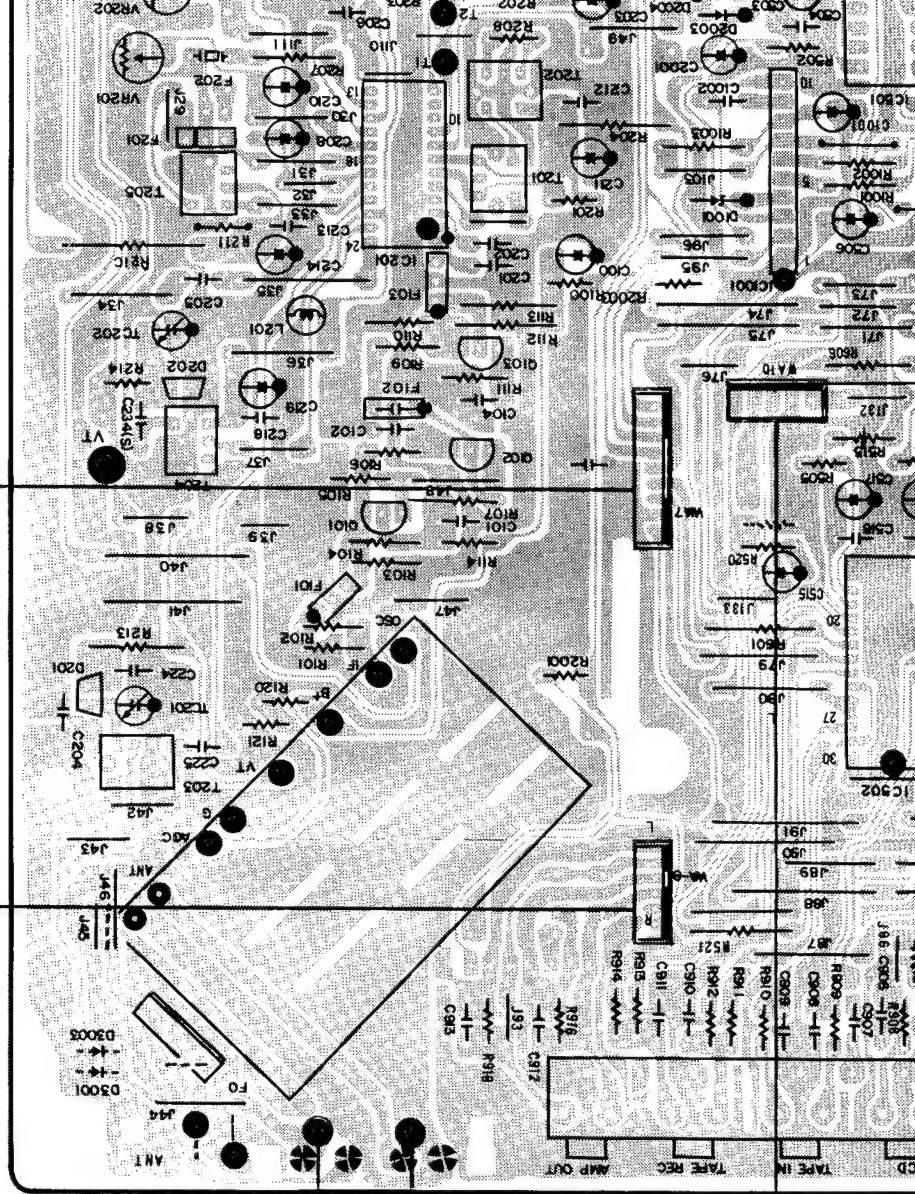
PCB - 3

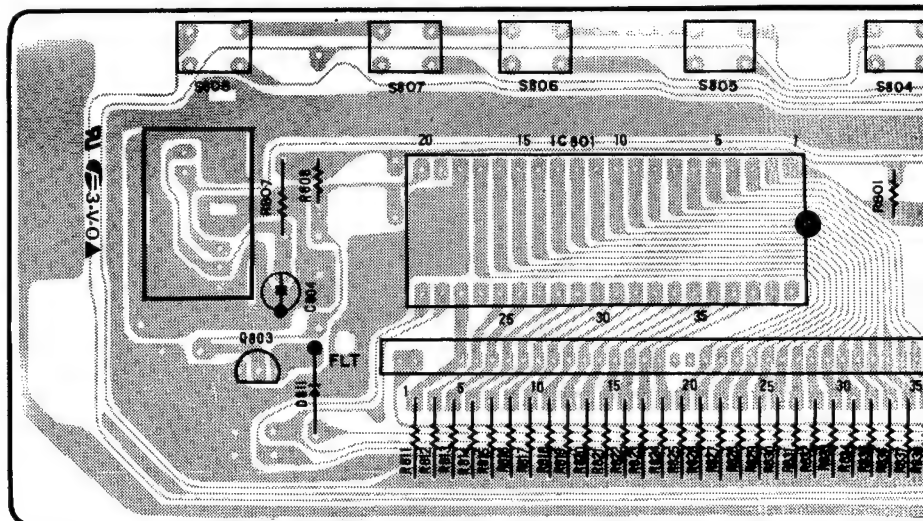
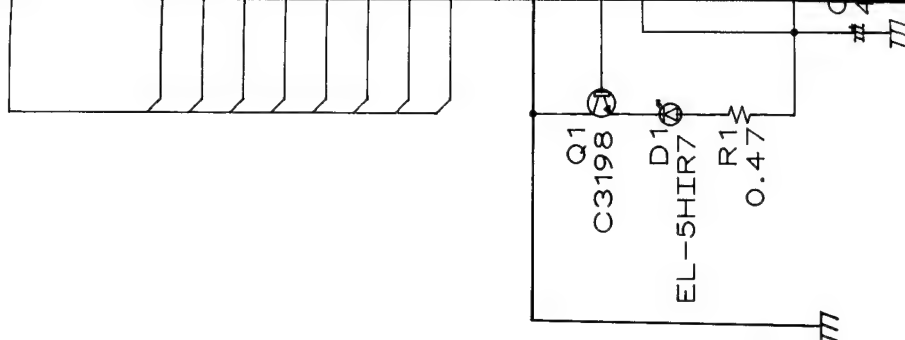
PCB - 1

MOTOR VOLUME ASSY



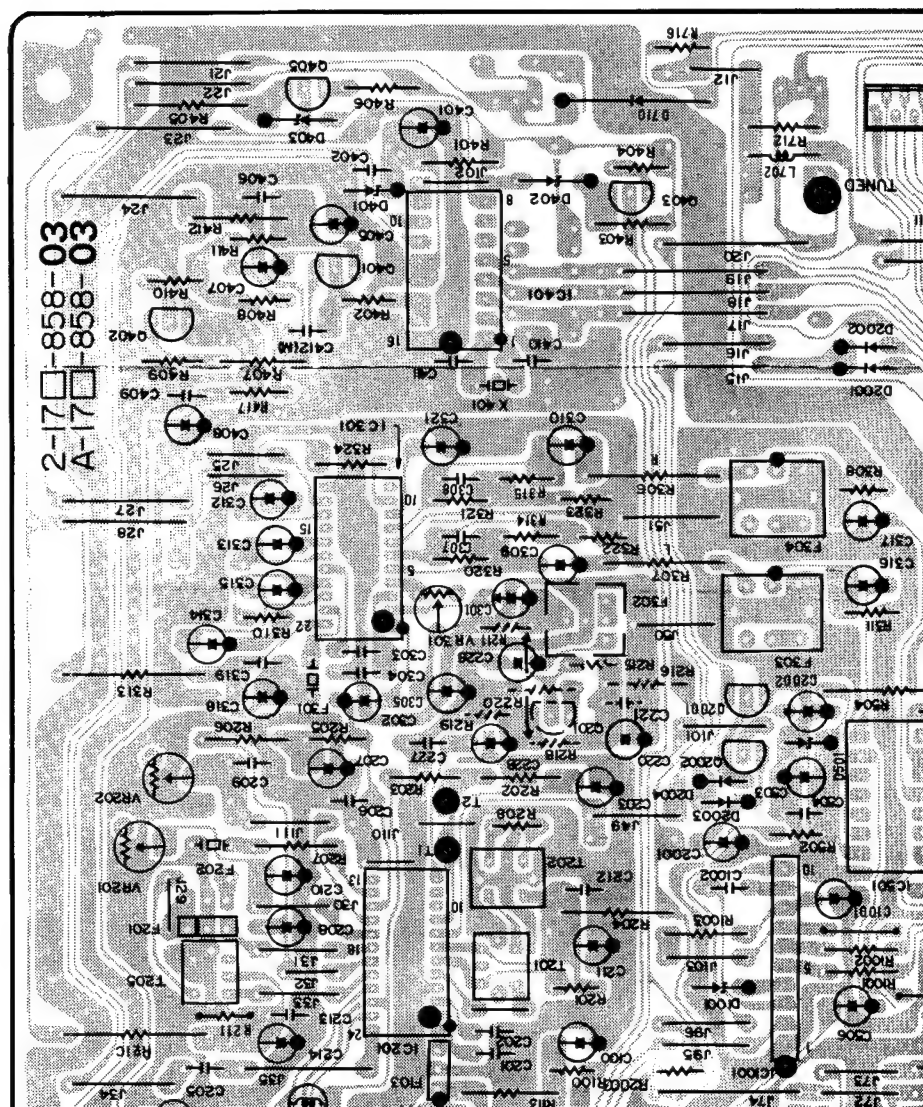
PCB - 2



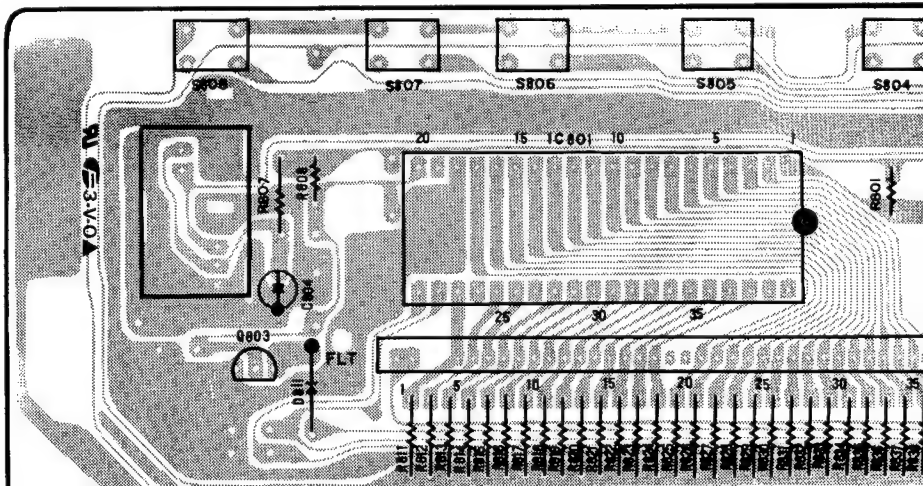
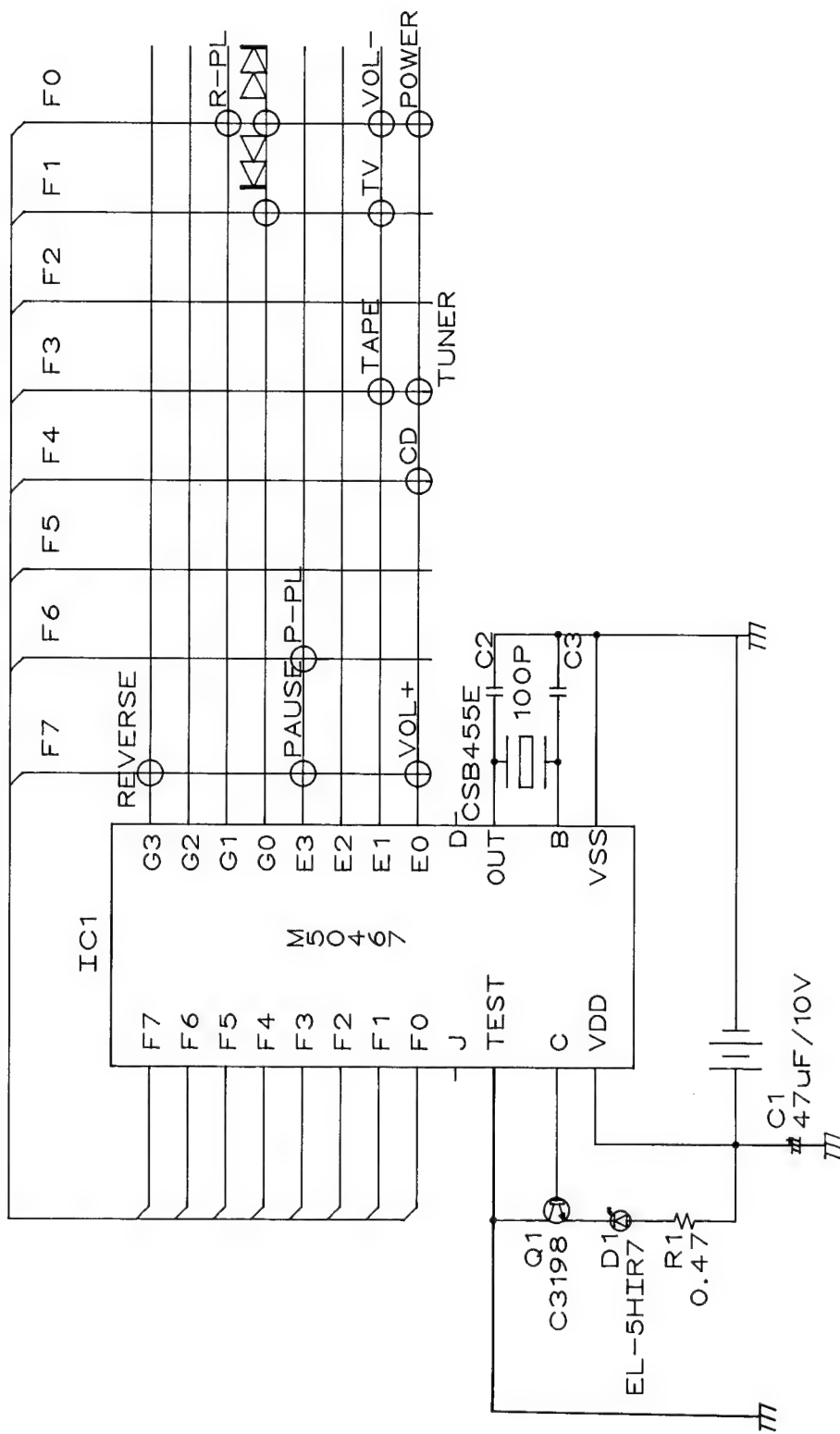


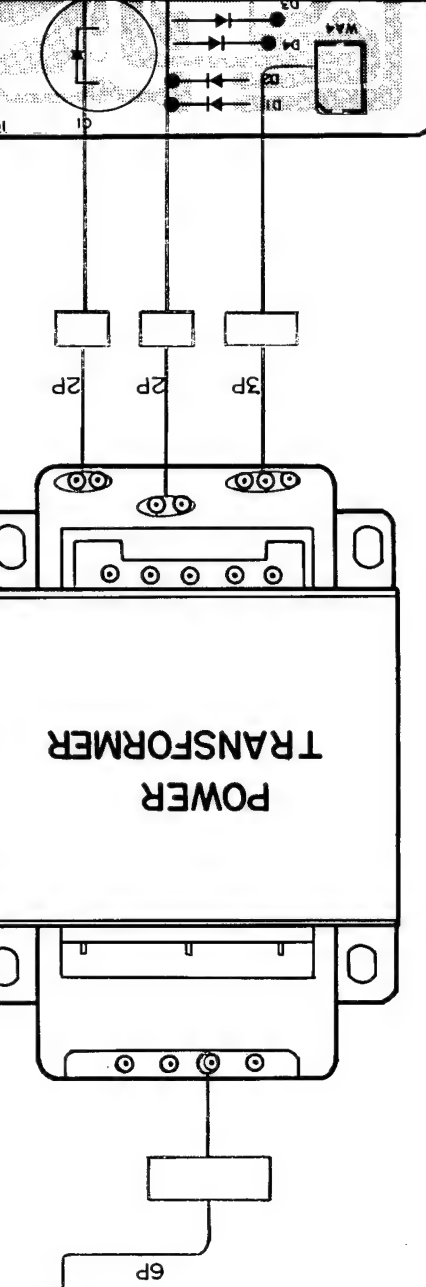
CONTROL UNIT ASS'Y

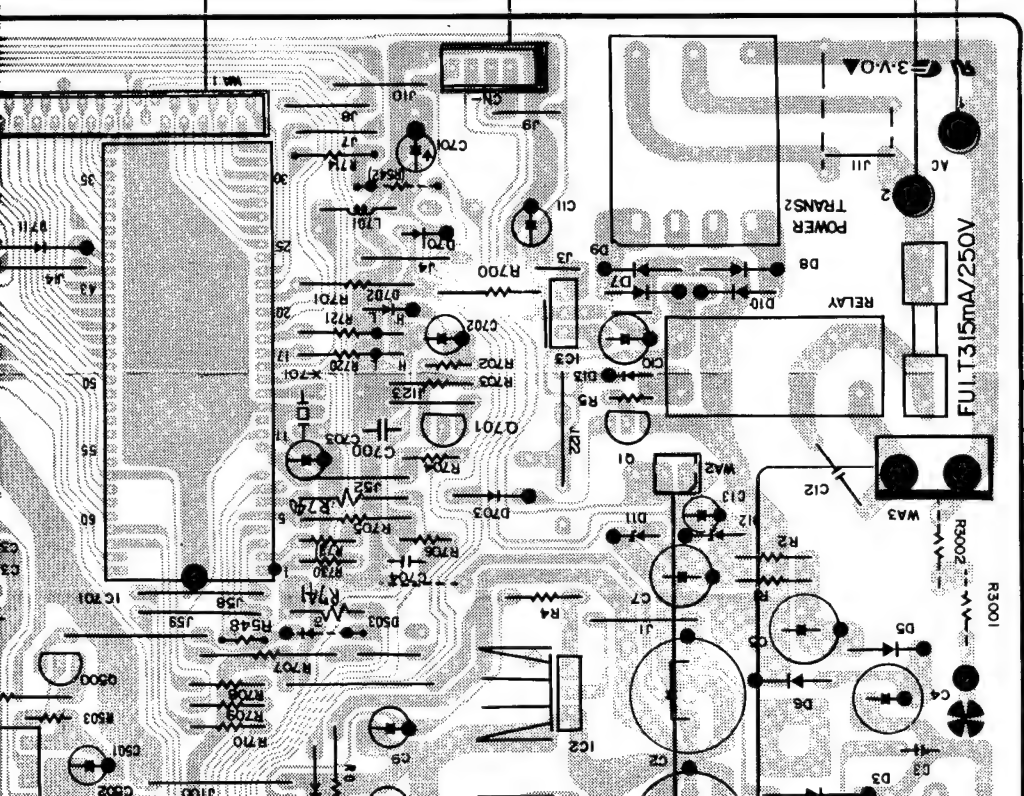
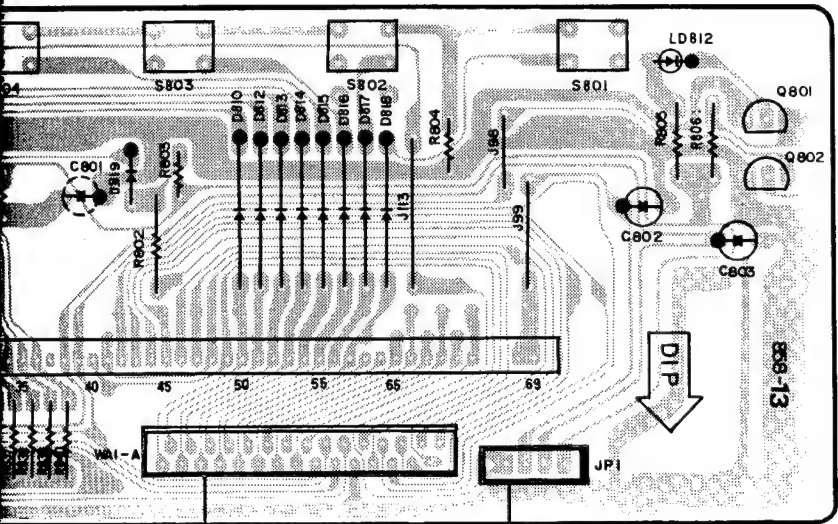
4



SCHEMATIC DIAGRAM (REMOTE CONTROL)



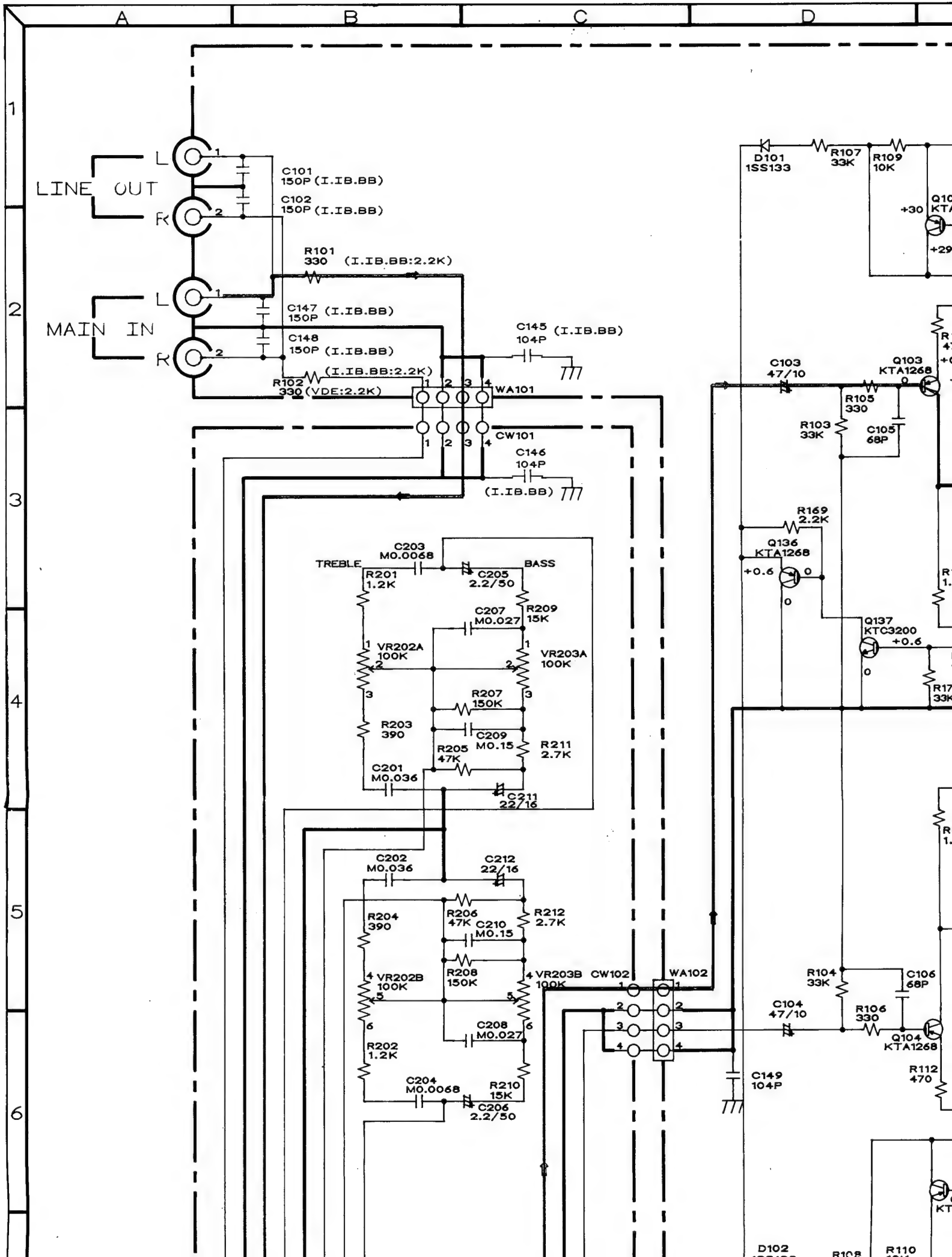


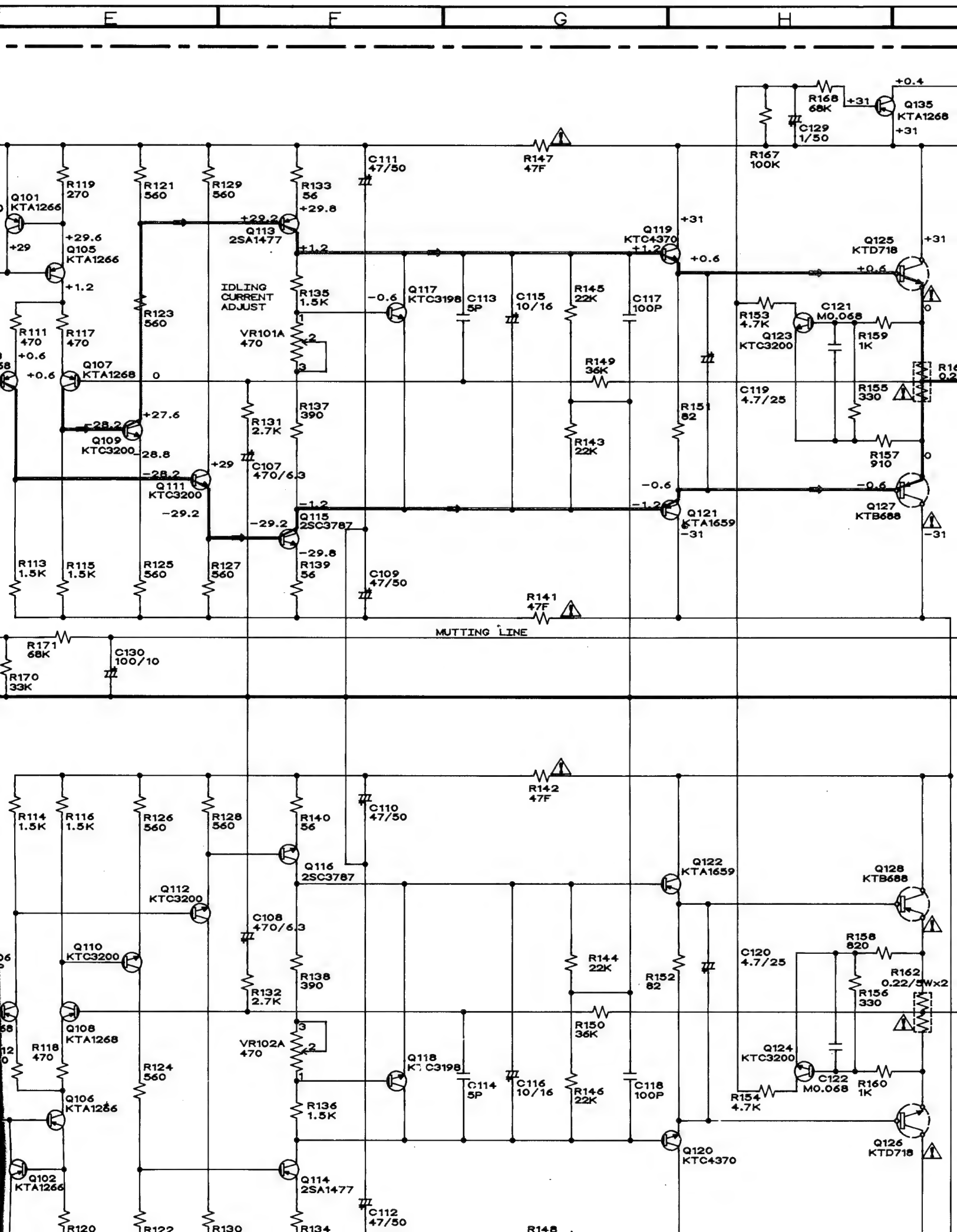


AC 120V 60HZ (USA)
AC 230V 50HZ (I, IB, BB)



SCHEMATIC DIAGRAM (A300)






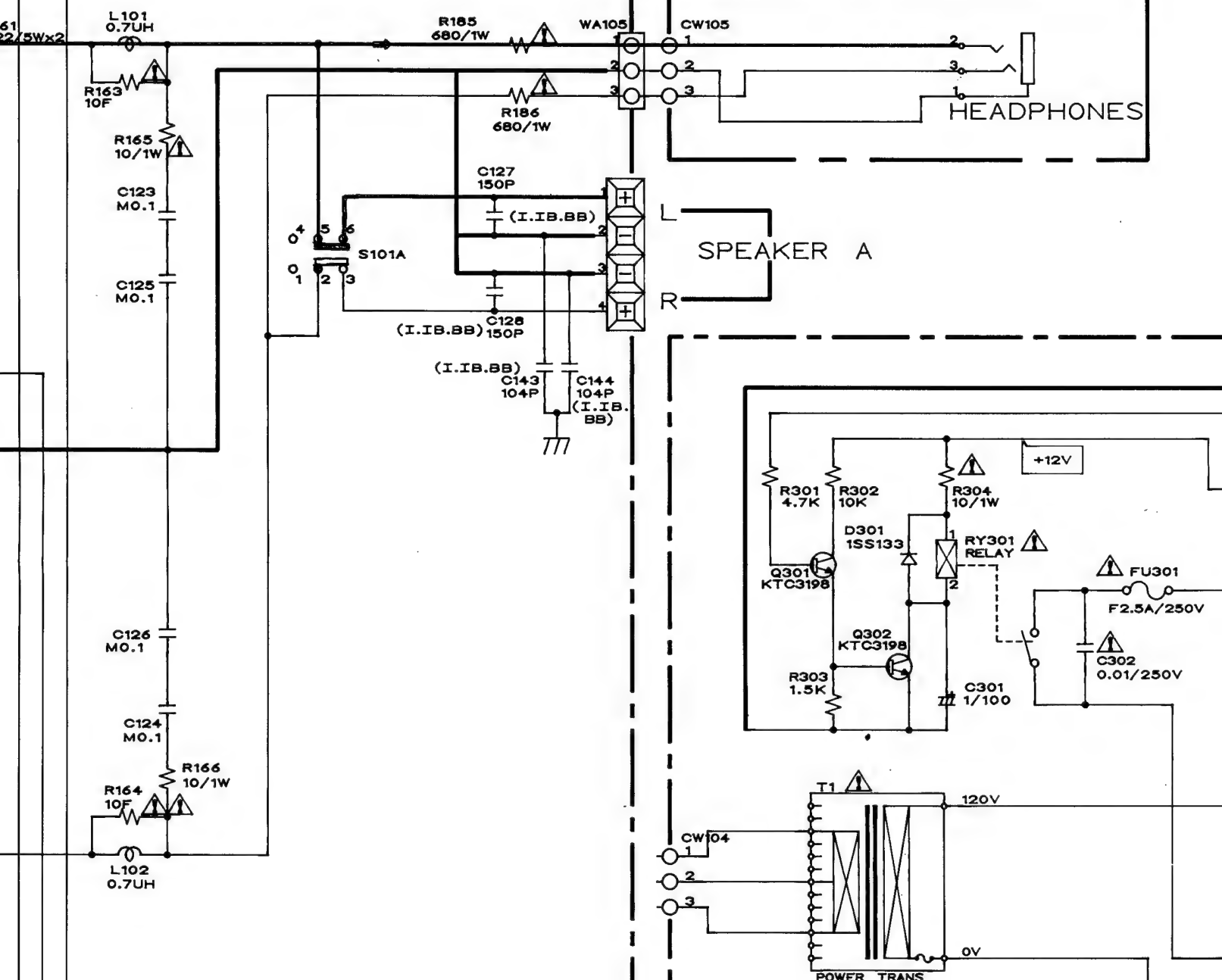
1.ALL RESISTANCE ARE 1/8 AND 1/4 WATTS, UNLESS OTHERWISE NOTED. VALUES ARE IN OHM. K = 1000 OHMS. M = 1000 K
2.ALL CAPACITANCE VALUES ARE IN uF, UNLESS OTHERWISE SPECIFIED. P = uUF

3.VOLTAGE  : DC VOLTAGE AT RATED 4 OHMS POWER VALUE IN () IS DC VOLTAGE AT NO

4.OTHERS  : ADJUSTING POINT.

THE  MARK FOUND ON SOME COMPONENT PARTS IMPORTANCE OF THE SAFETY FACTOR OF THE PARTS REPLACING, BE SURE TO USE PARTS OF IDENTICAL

 : THIS IS THE BASIC SCHEMATIC DIAGRAM, BUT THE ACTUAL MAY VARY DUE TO IMPROVEMENTS IN DESIGN
(I.I.B.BB : C101,102,127,128,143,144,147,148,149,150)



K

L

M


N


1.ALL RESISTANCE ARE 1/8 AND 1/4 WATTS, UNLESS OTHERWISE

NOTED. VALUES ARE IN OHM. K = 1000 OHMS, M = 1000 K OHMS


2.ALL CAPACITANCE VALUES ARE IN UF, UNLESS OTHERWISE

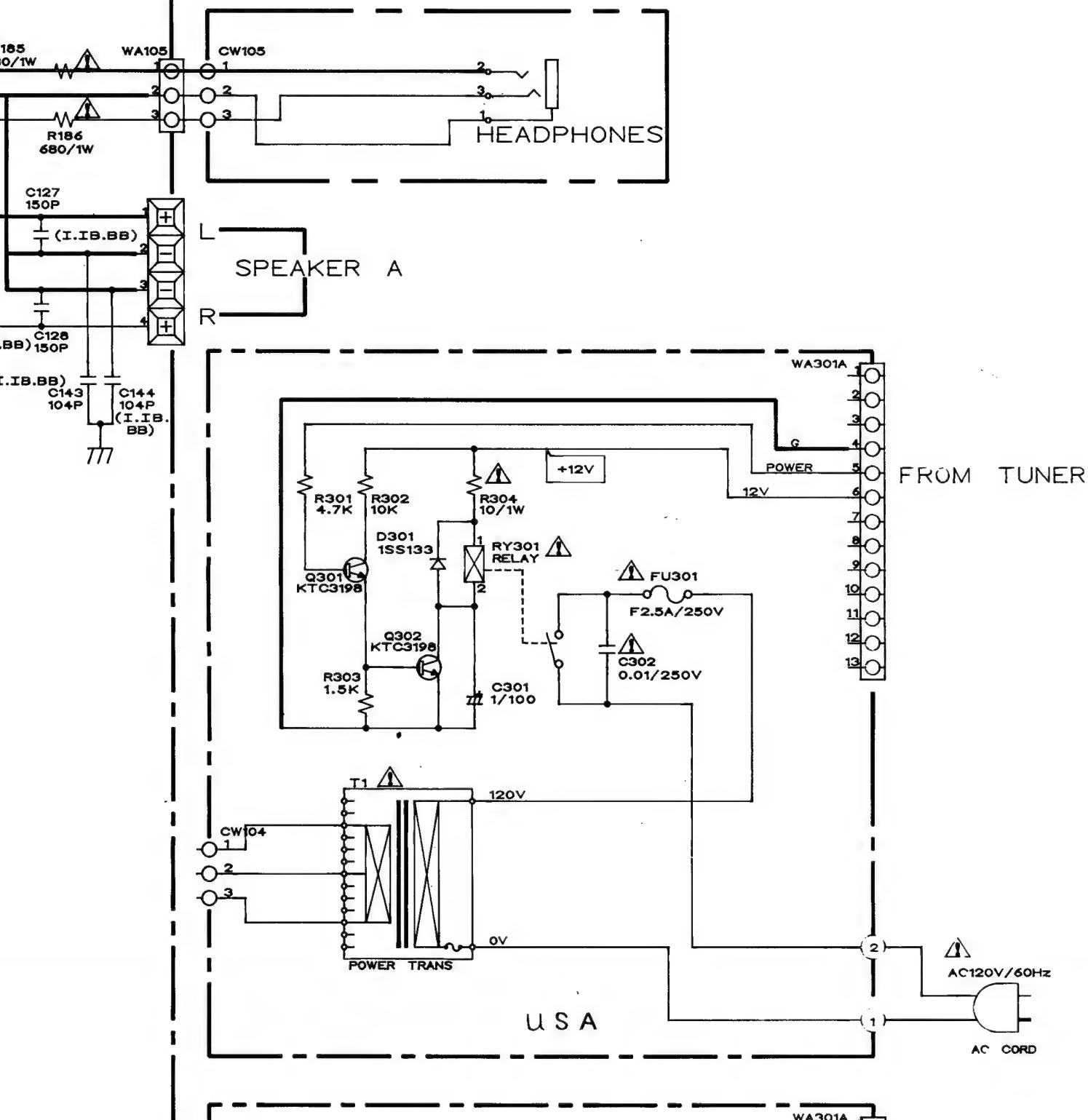
SPECIFIED. P = UUF

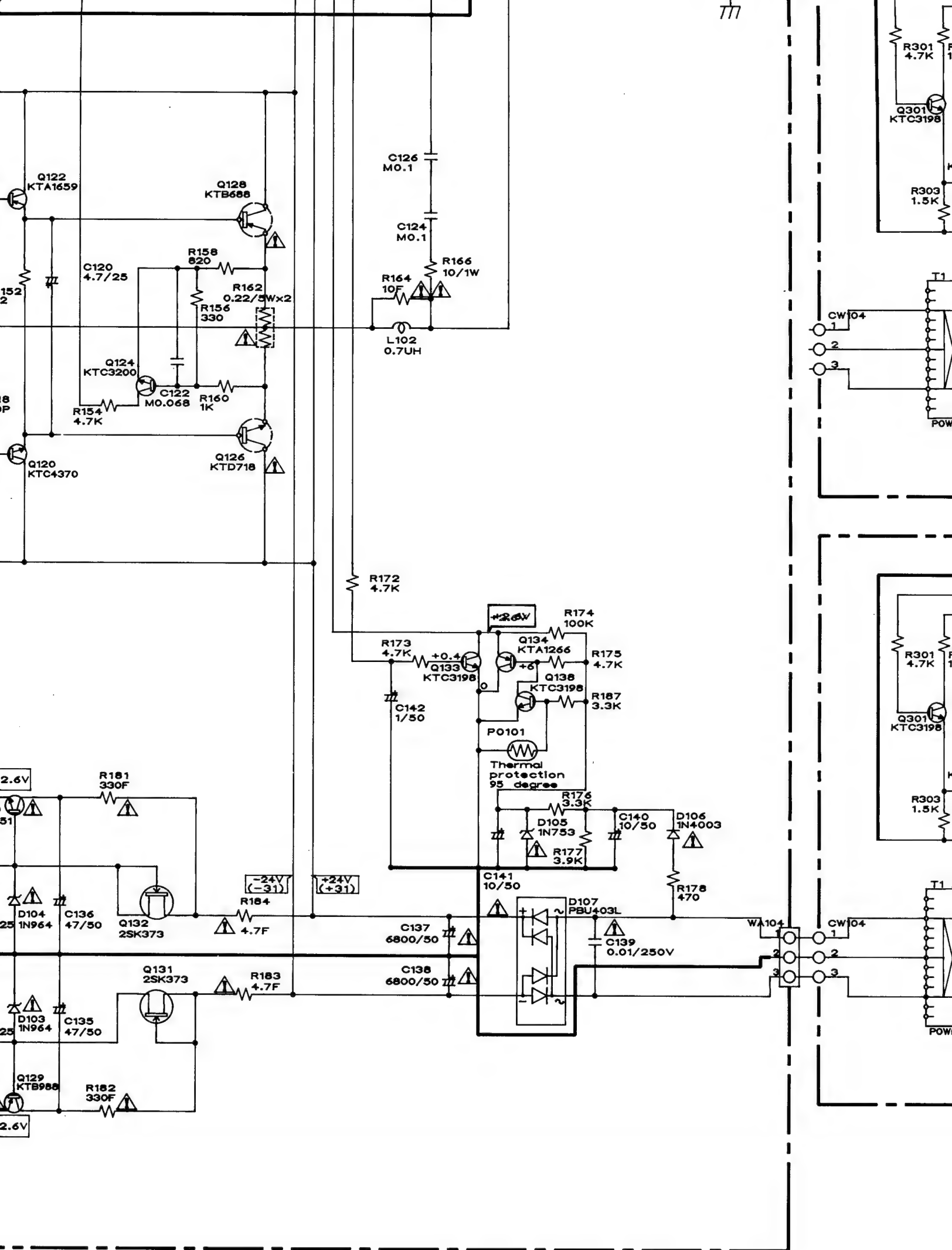
3.VOLTAGE  : DC VOLTAGE AT RATED 4 OHMS POWER
VALUE IN () IS DC VOLTAGE AT NO INPUT SIGNAL

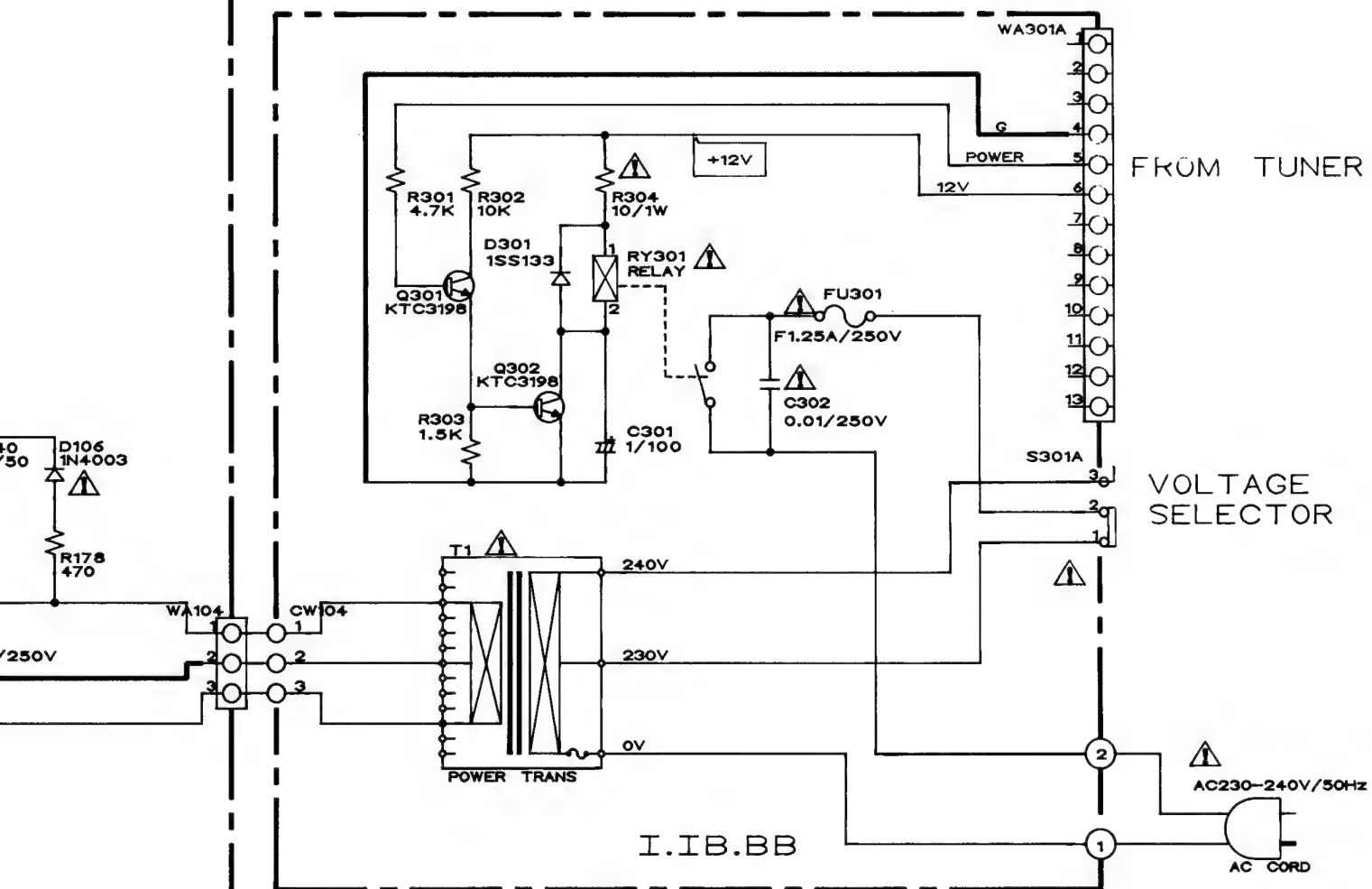
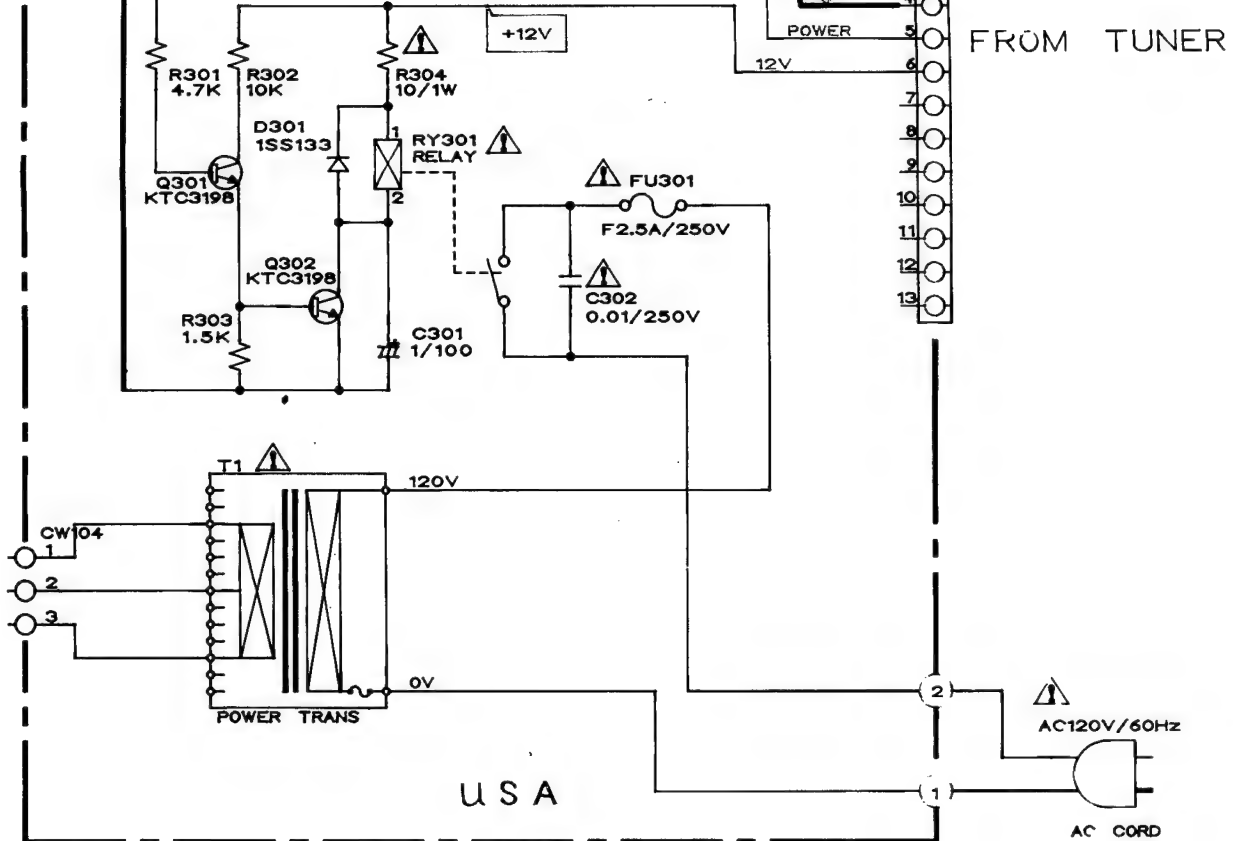
4.OTHERS  : ADJUSTING POINT.

THE  MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.

 : THIS IS THE BASIC SCHEMATIC DIAGRAM, BUT THE ACTUAL CIRCUIT MAY VARY DUE TO IMPROVEMENTS IN DESIGN
(I.I.B.B : C101,102,127,128,143,144,147,148,149,150)



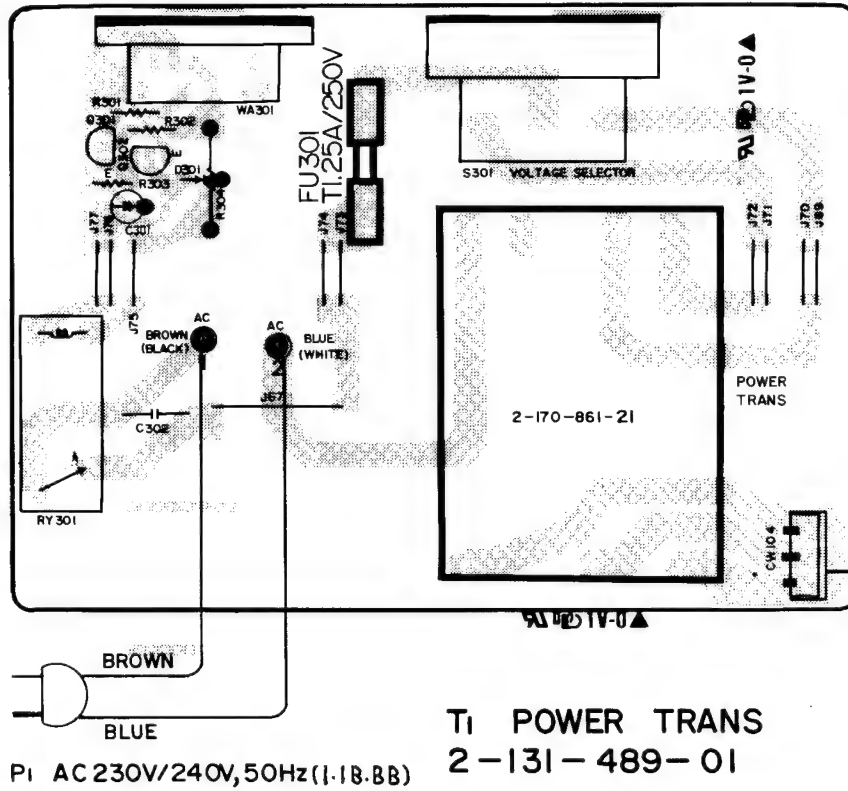




WIRING DIAGRAM

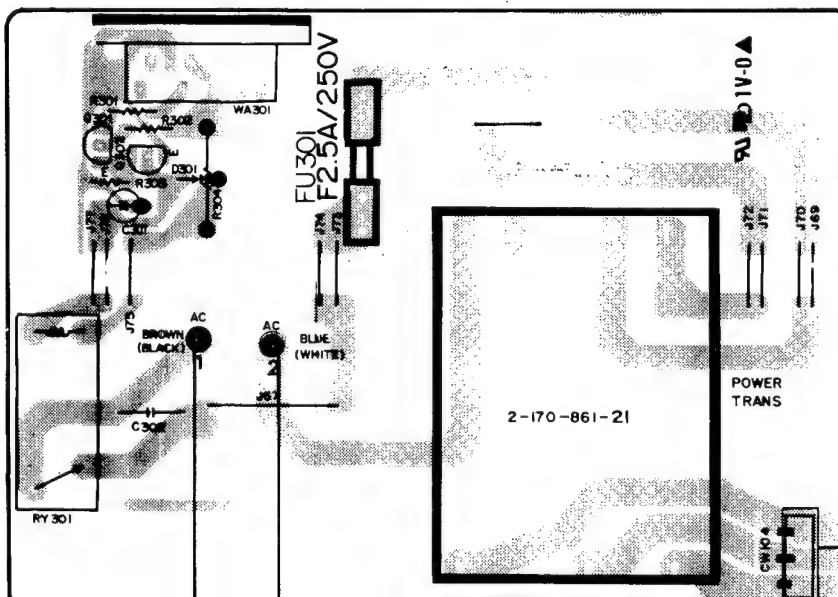
A-300

PCB-3 POWER RELAY P.C.B



T1 POWER TRANS
2-131-489-01

PCB-3 POWER RELAY P.C.B

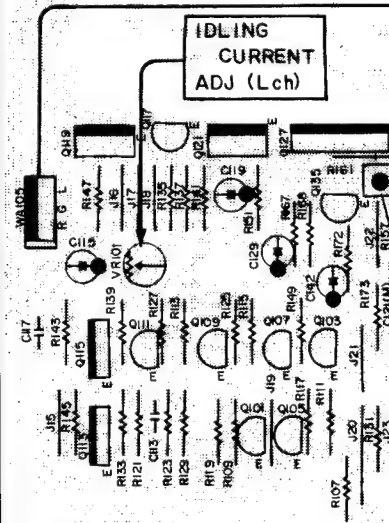


C128

C144 C143
J79
S101 SPEAKERS SWITCH

CW105

IDLING
CURRENT
ADJ (Lch)

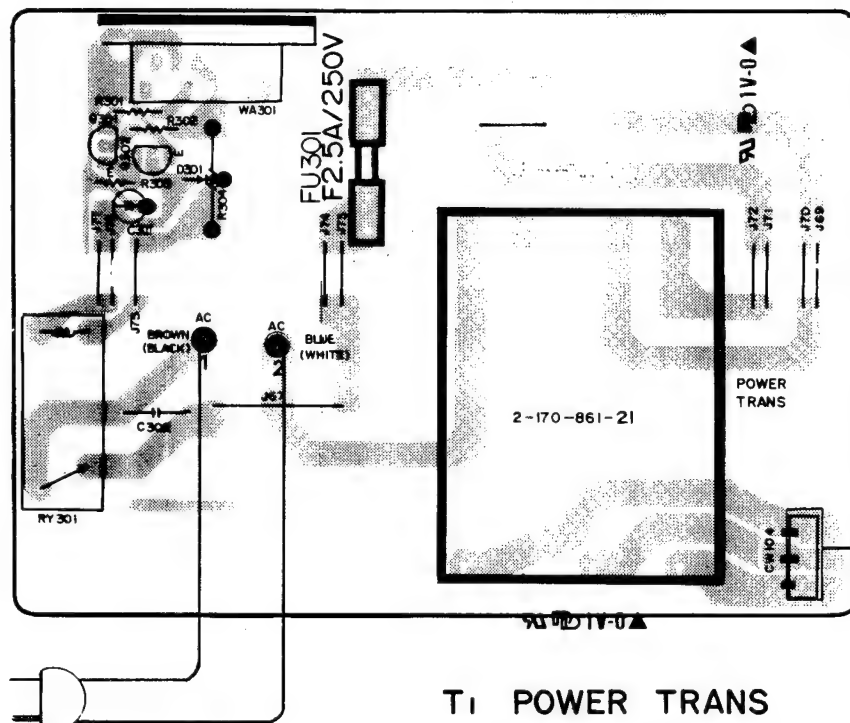




CW105
R G L

P1 AC120V/60Hz (USA)

PCB-3 POWER RELAY P.C.B

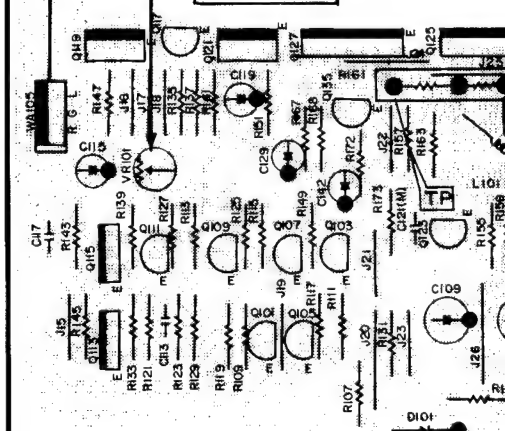


T1 POWER TRANS
2-131-494-01

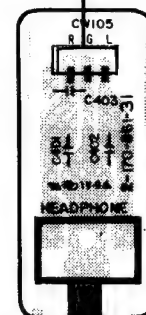
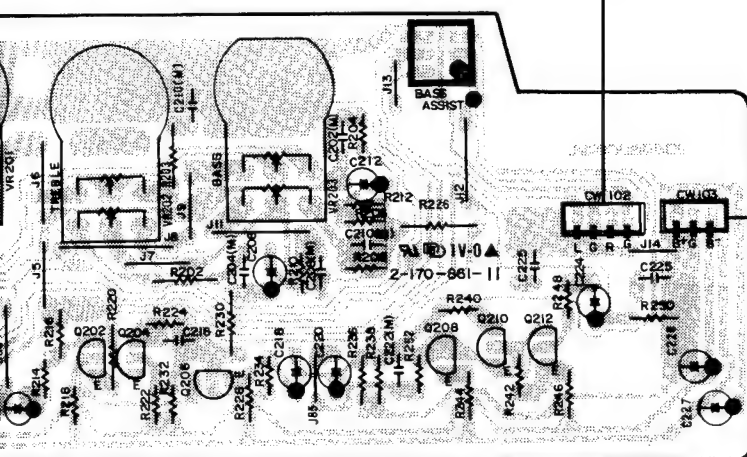
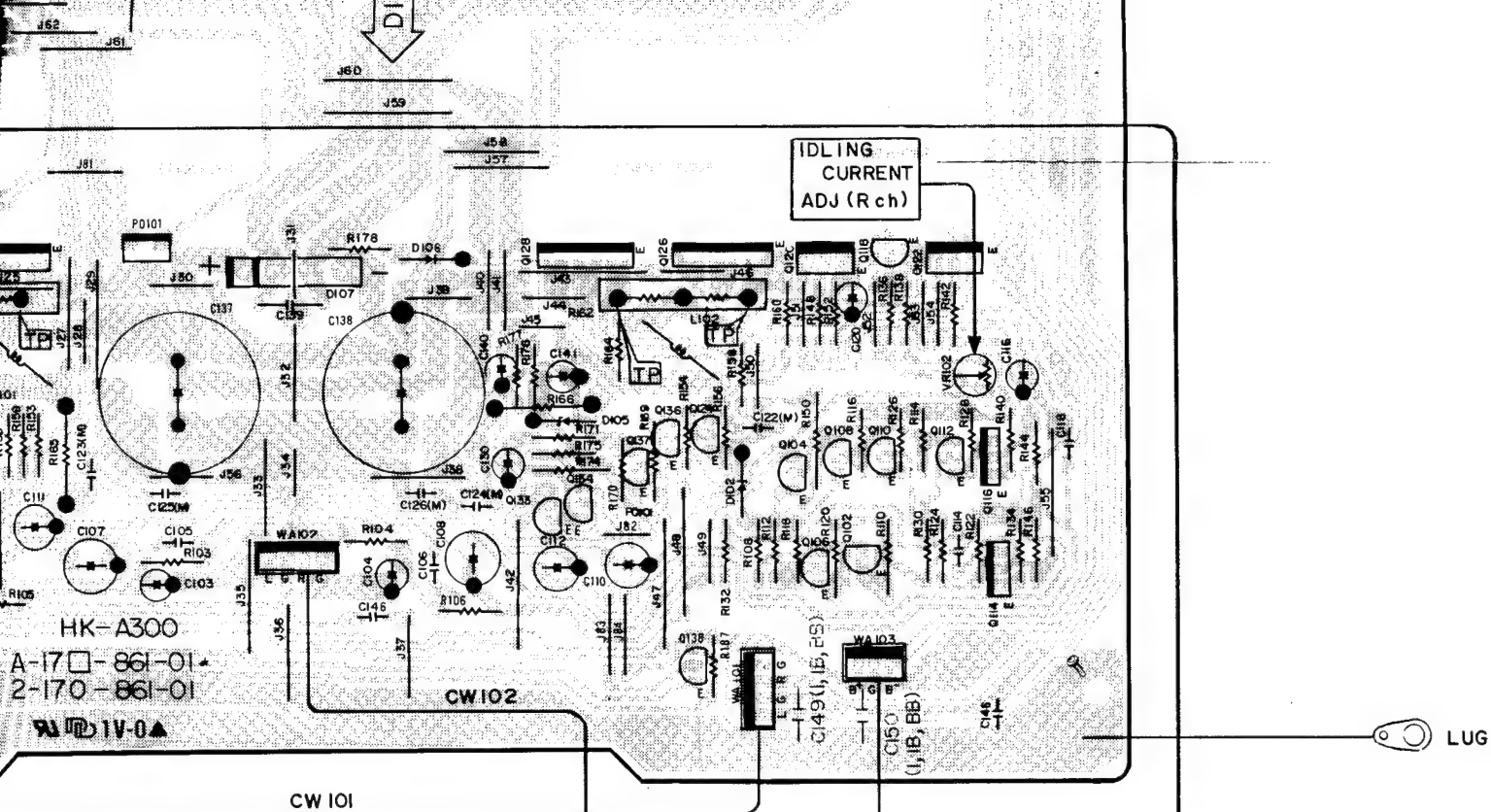
P1 AC120V/60Hz (USA)

CW 105

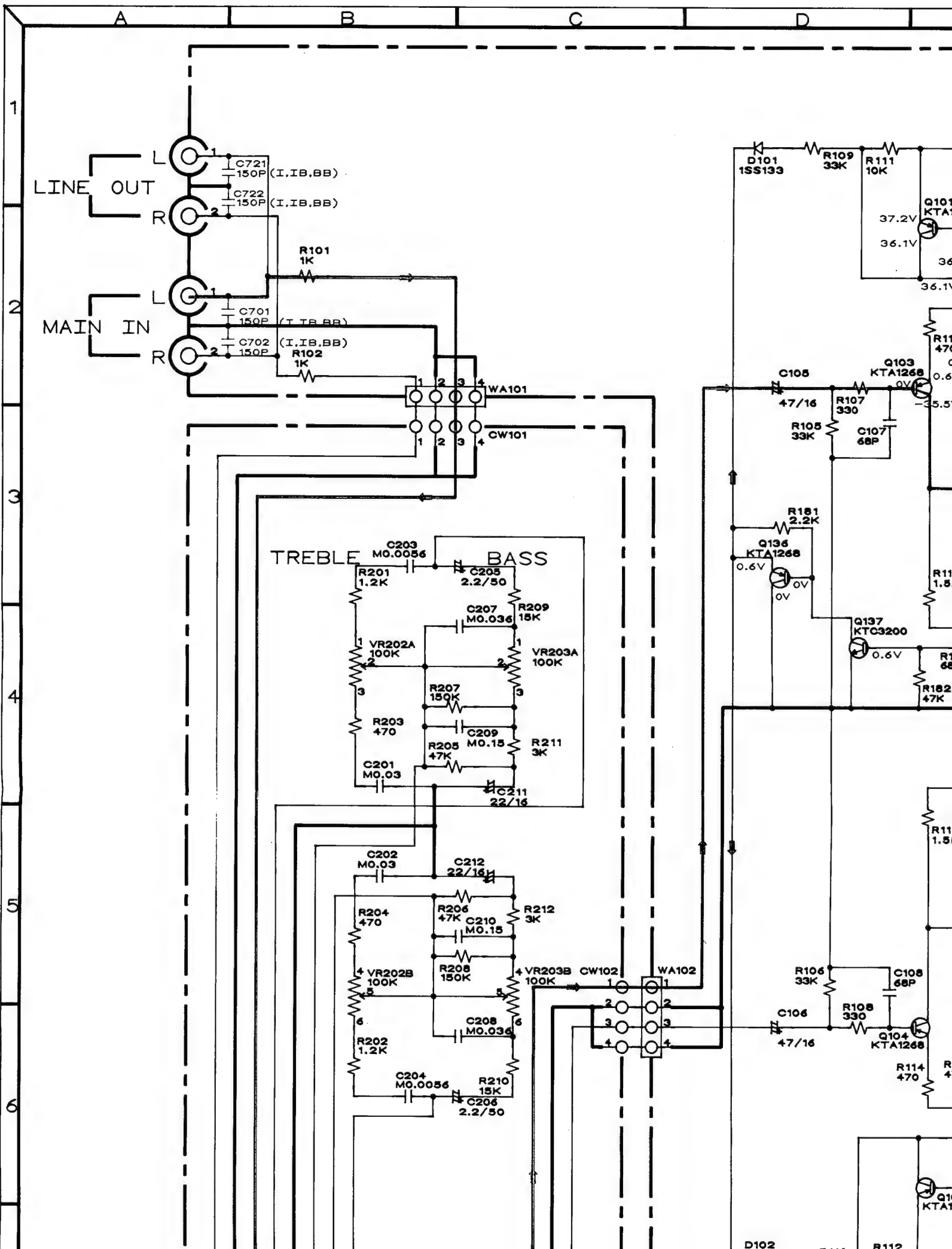
IDLING
CURRENT
ADJ (Lch)

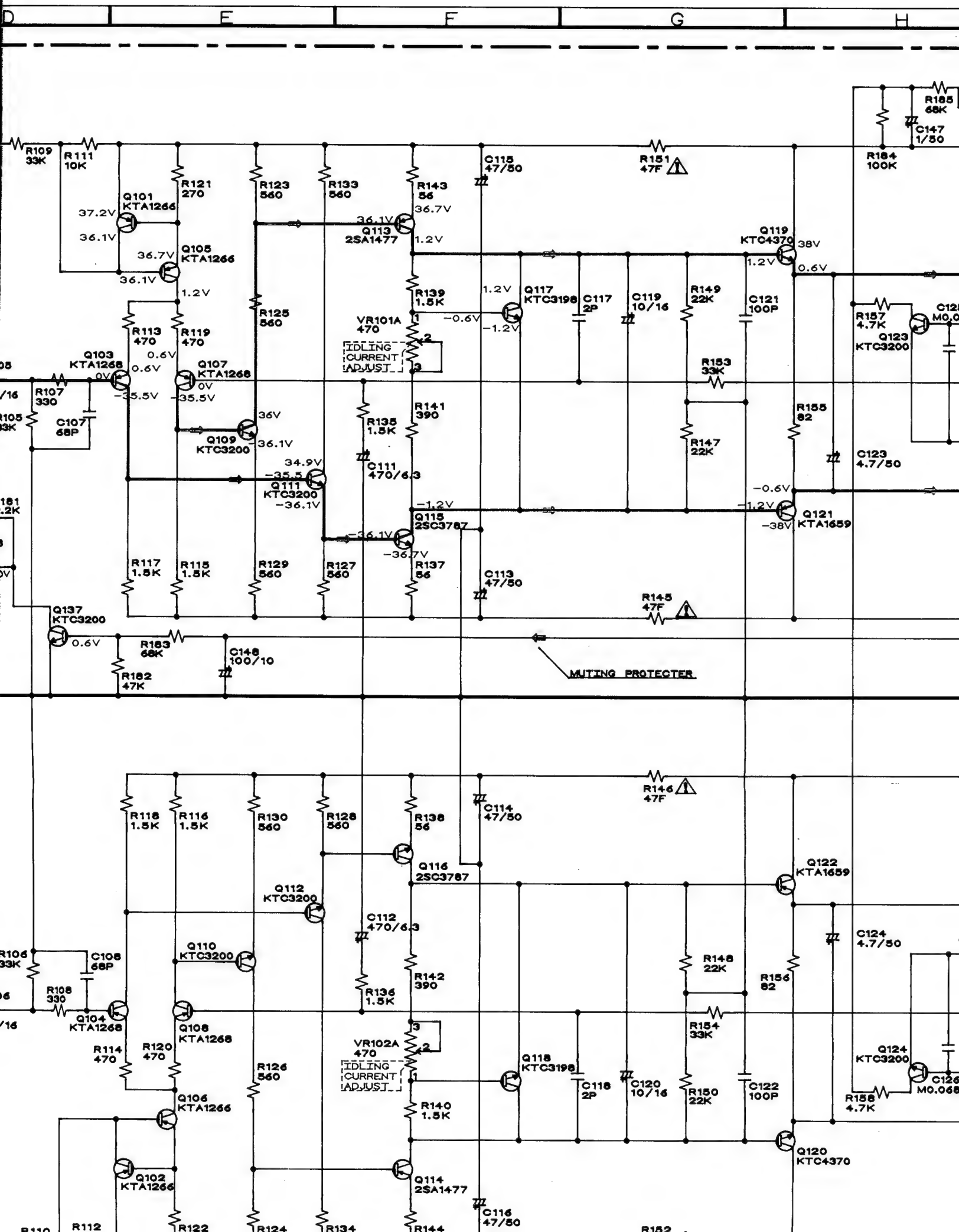


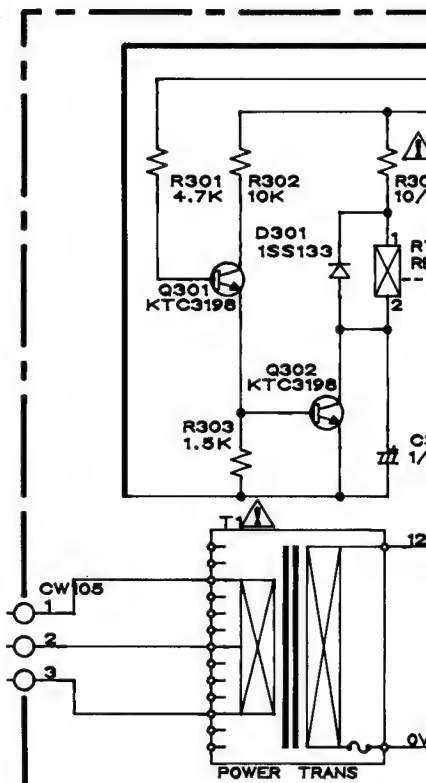
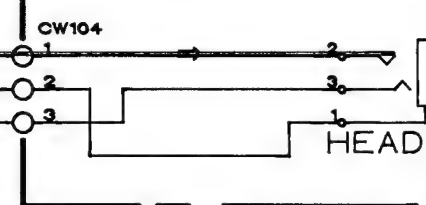
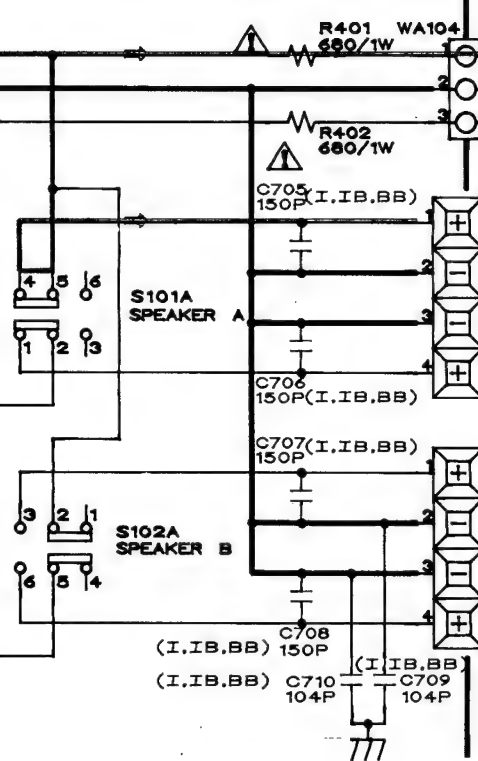
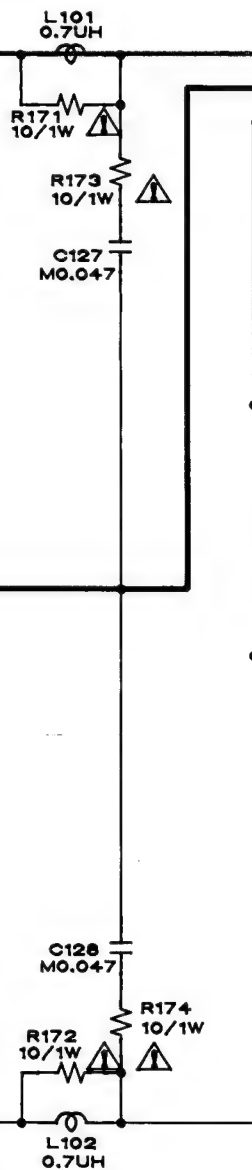
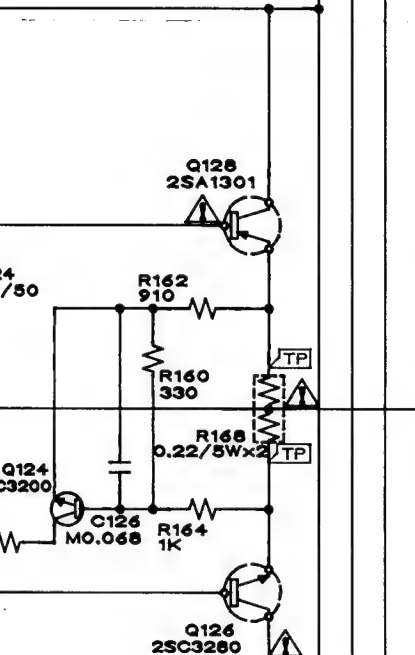
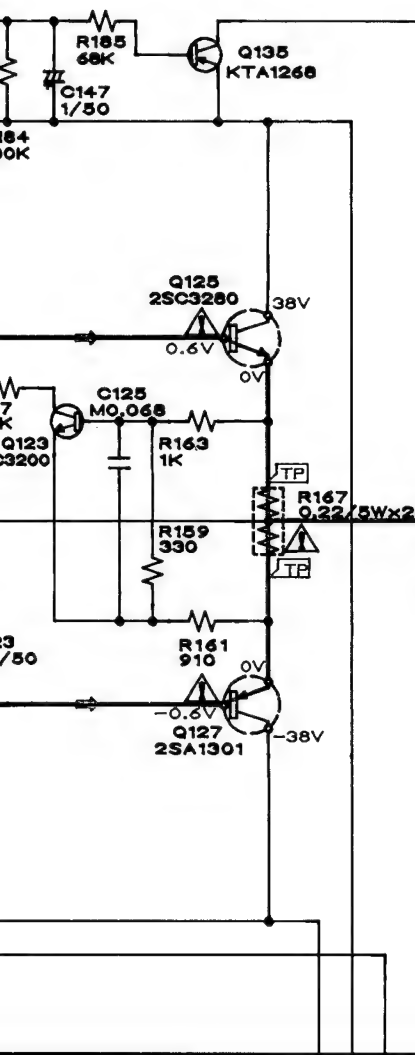
PCB-2



SCHEMATIC DIAGRAM (A500)







1. ALL RESISTANCES ARE 1/8 AN INCH UNLESS NOTED. VALUES ARE IN OHM.
 2. ALL CAPACITANCE VALUES ARE IN P.F. UNLESS SPECIFIED. P = μ F
 3. VOLTAGE \square DC VOLTAGE VALUE IN ()

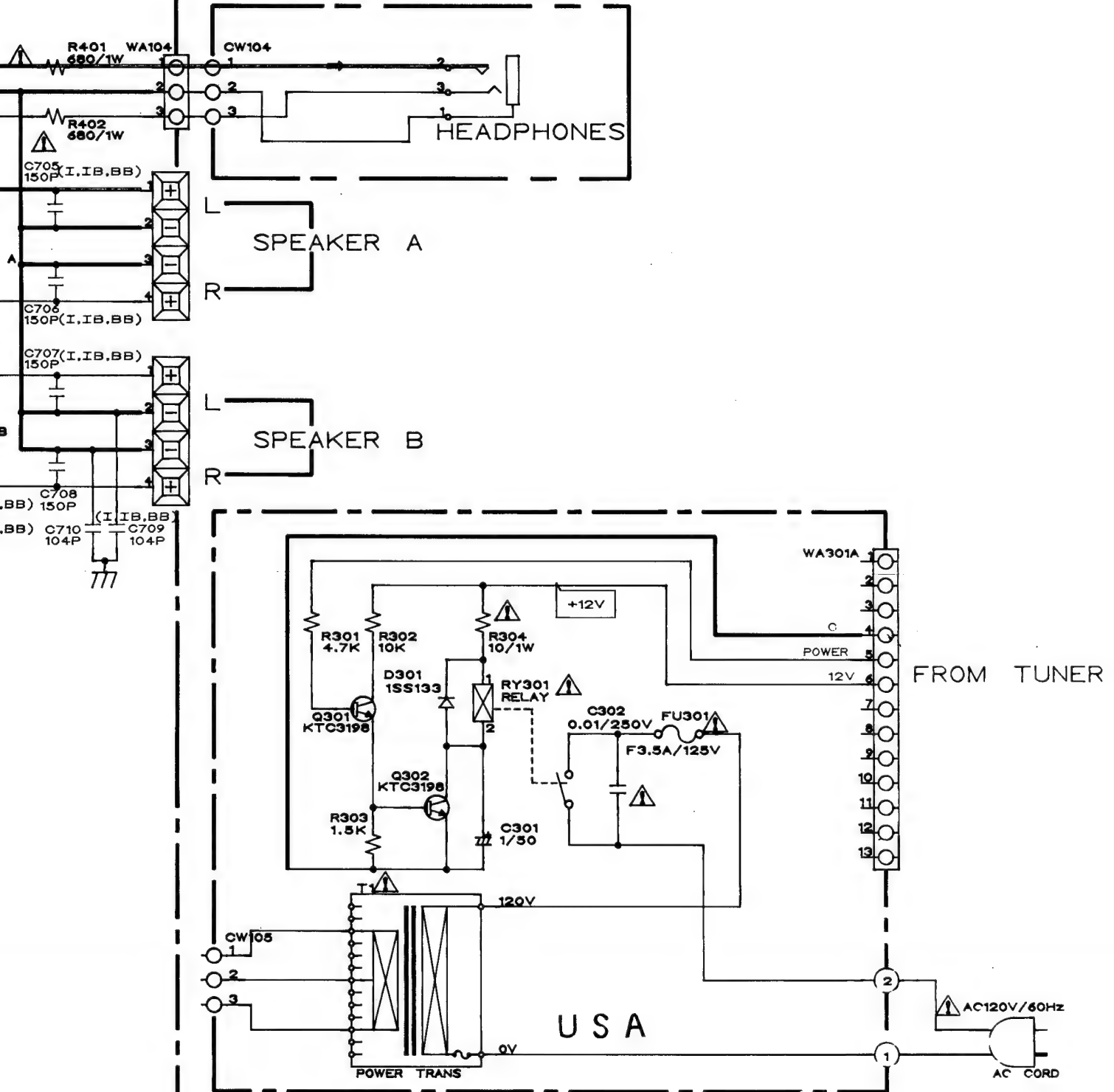
4. OTHERS
 \odot : ADJUSTING POINT.
 \triangle : THE MARK FOUND ON SOME IMPORTANCE OF THE SAFETY REPLACING, BE SURE TO USE

\otimes THIS IS THE BASIC SCHEMATIC MAY VARY DUE TO IMPROVEMENT

C701 - C722 : FOR FTZ (I.J.)

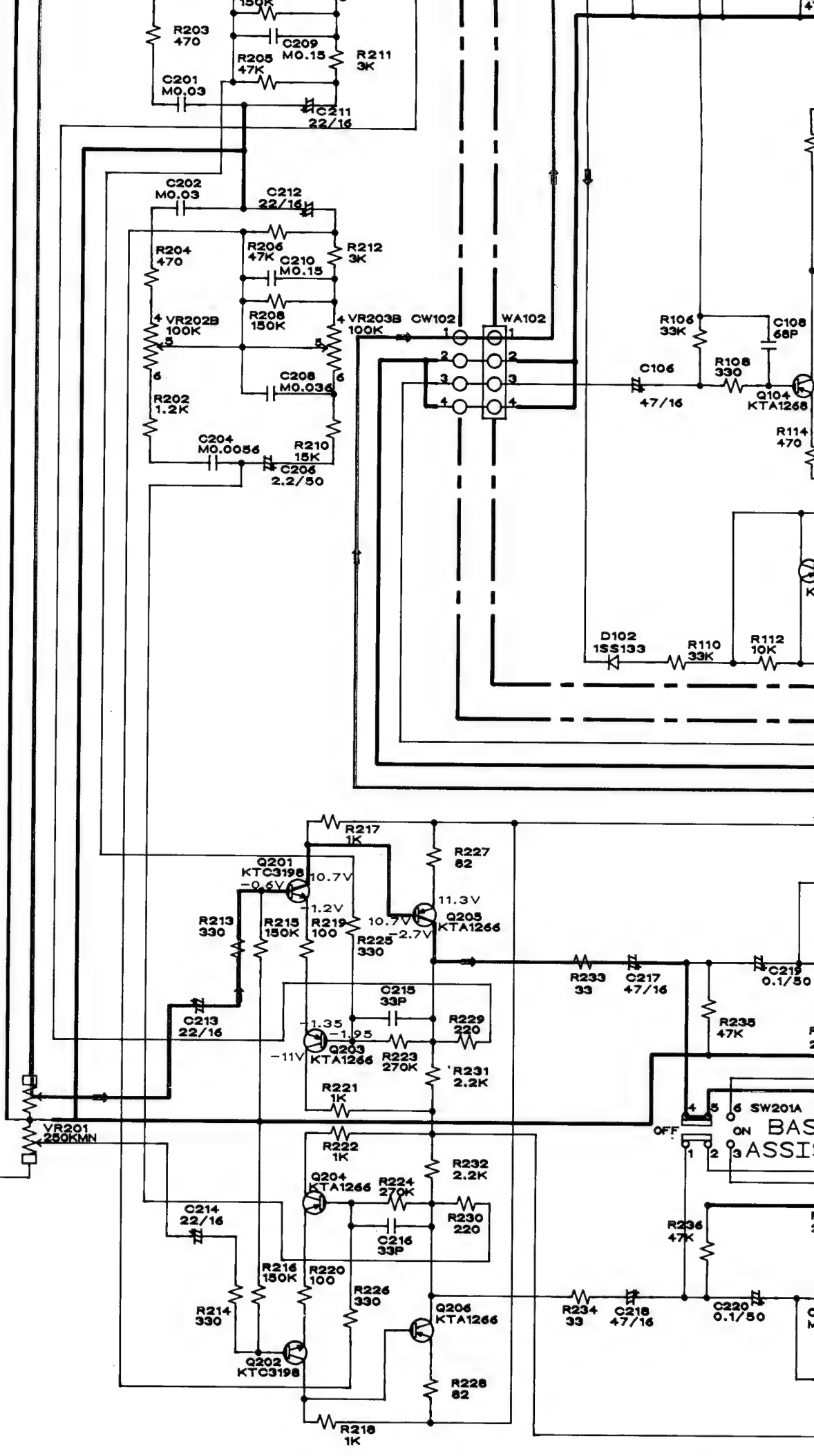
- 1.ALL RESISTANCES ARE 1/8 AND 1/4 WATTS, UNLESS OTHERWISE NOTED. VALUES ARE IN OHM. K = 1000 OHMS, M = 1000 K OHMS
 - 2.ALL CAPACITANCE VALUES ARE IN uF,UNLESS OTHERWISE SPECIFIED. P = uUF
 - 3.VOLTAGE :DC VOLTAGE, AT RATED 4 OHMS POWER
VALUE IN () IS DC VOLTAGE AT NO INPUT SIGNAL
 - 4.OTHERS
⊘ : ADJUSTING POINT .
⚠ THE ⚠ MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.
- ⚠ THIS IS THE BASIC SCHEMATIC DIAGRAM, BUT THE ACTUAL CIRCUIT MAY VARY DUE TO IMPROVEMENTS IN DESIGN.

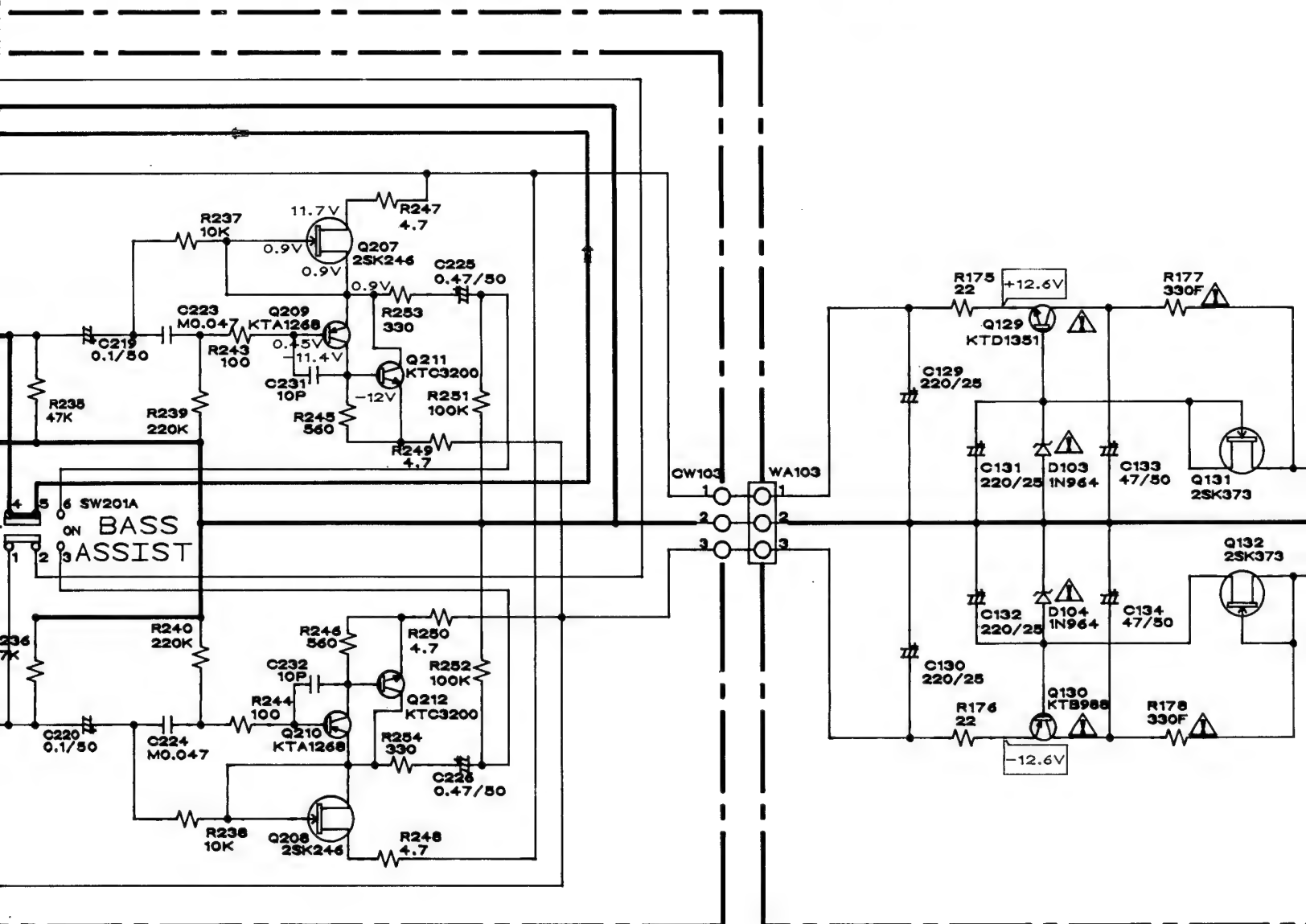
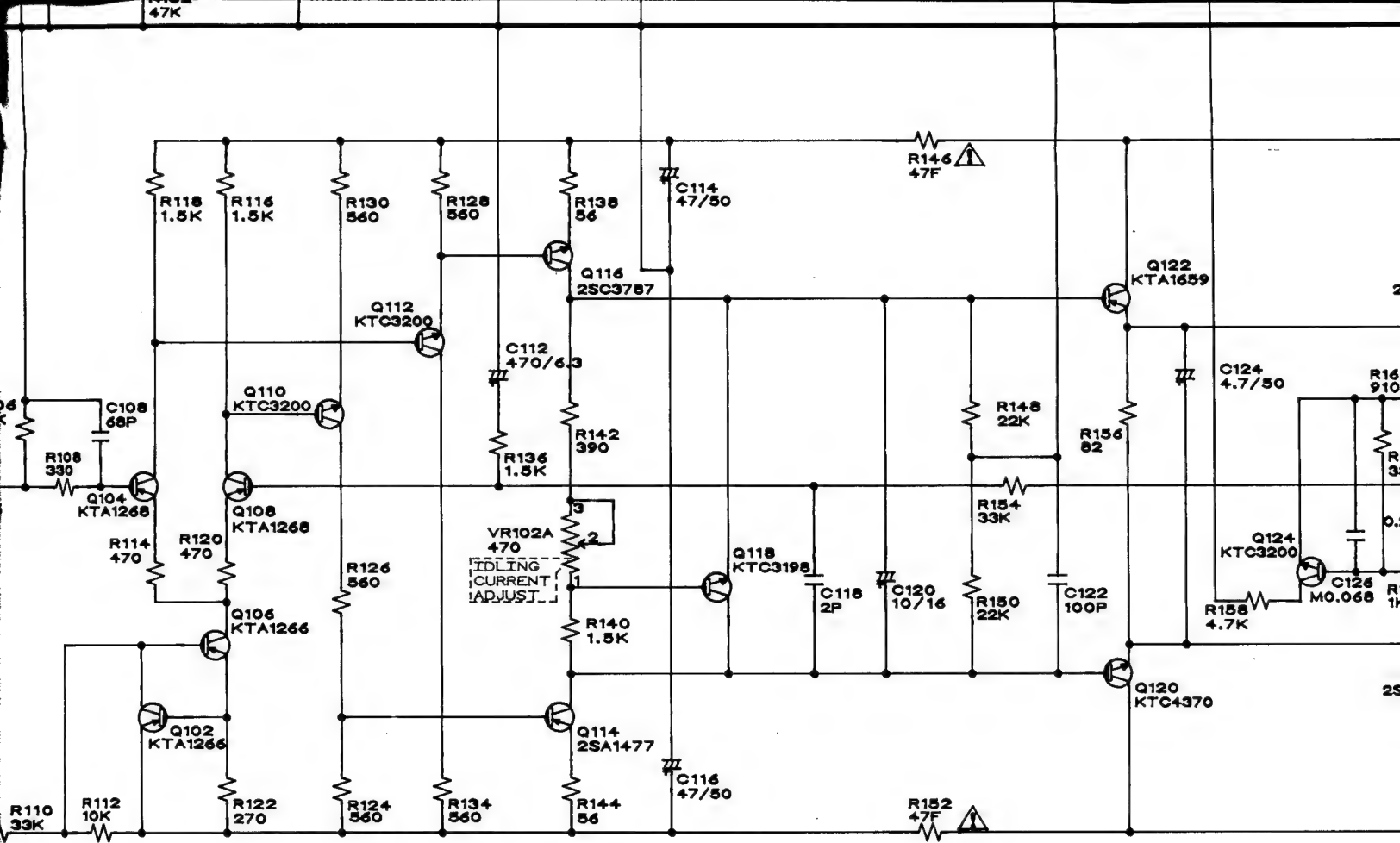
C701 - C722 : FOR FTZ (I,IB,BB)

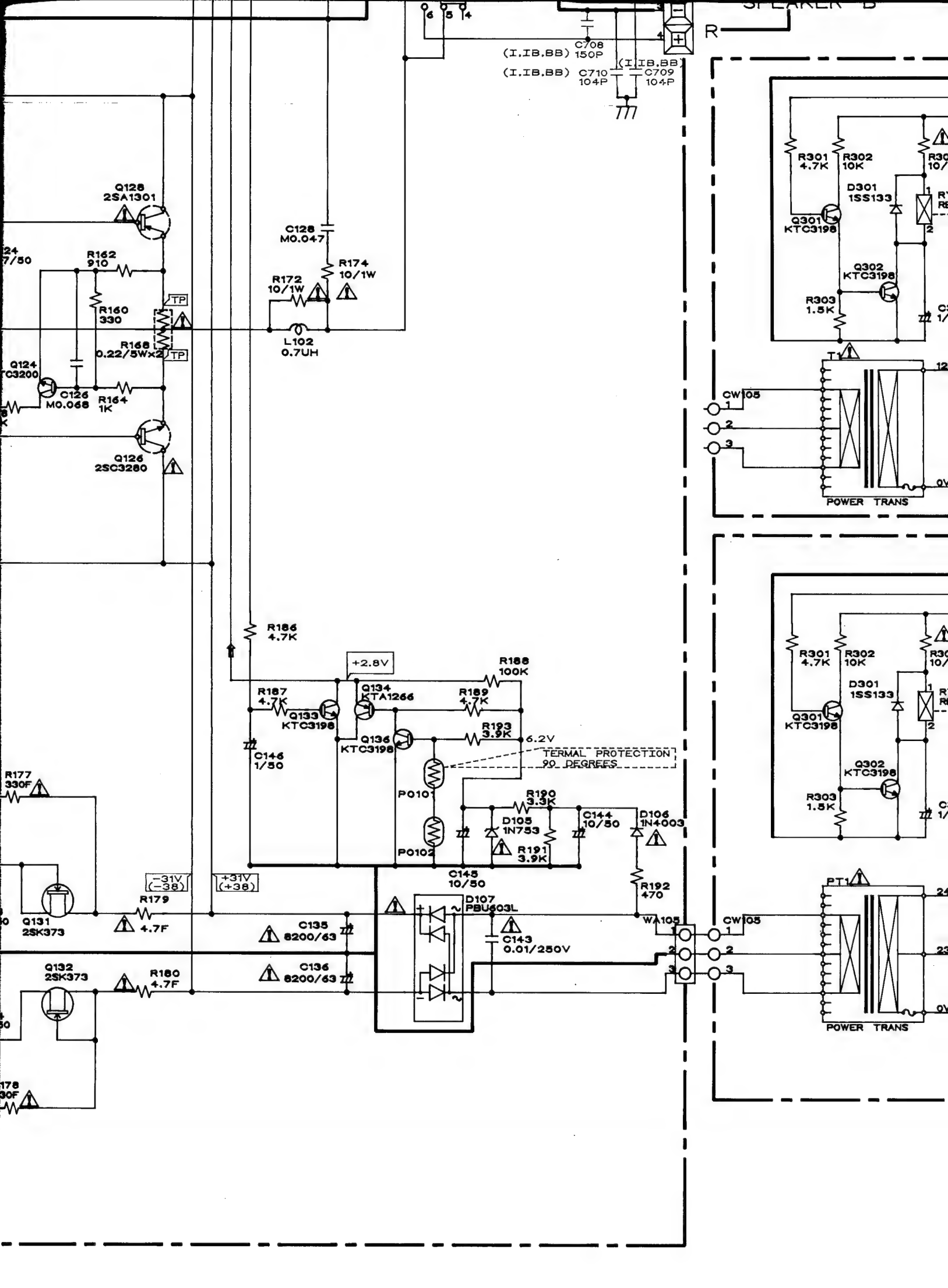


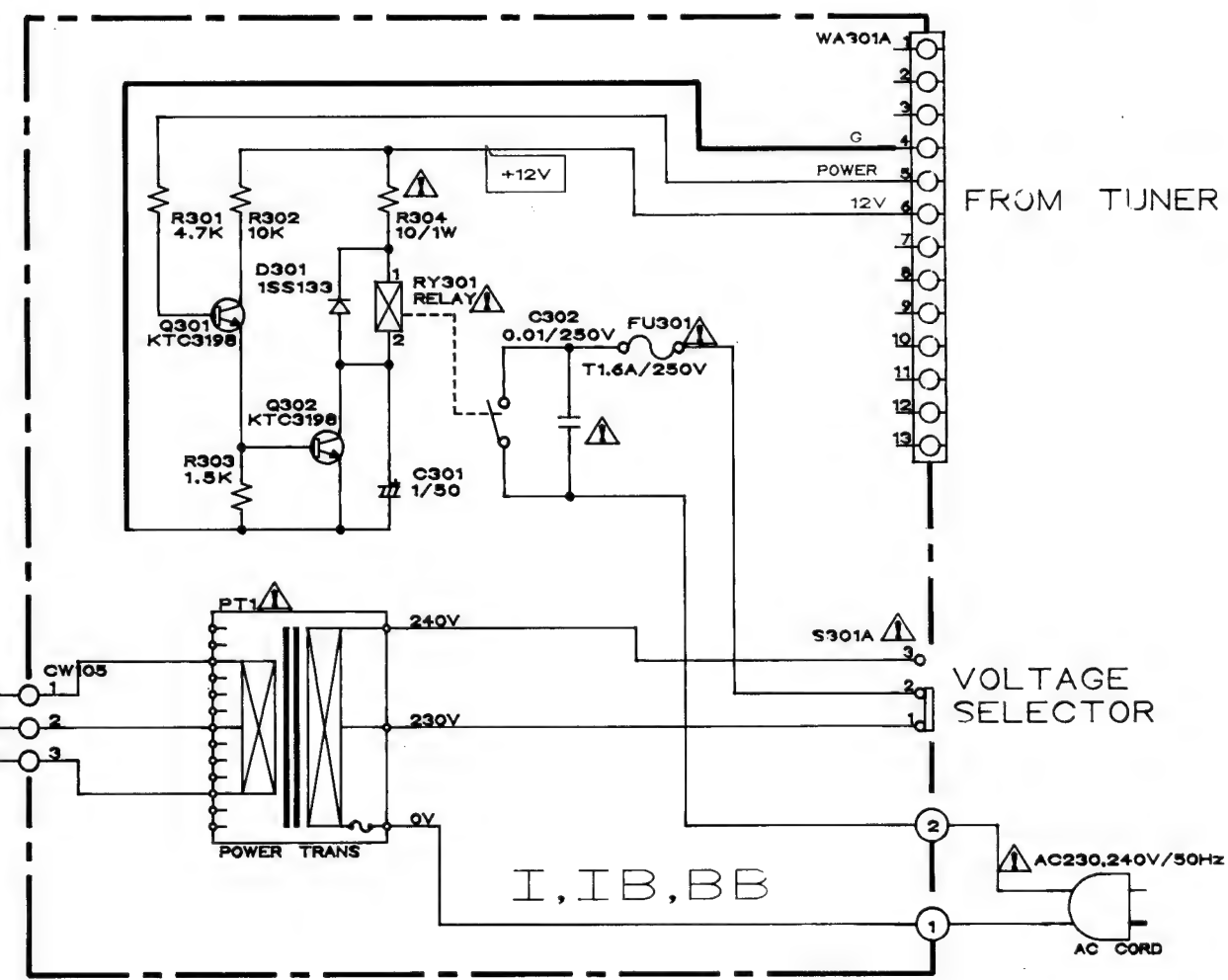
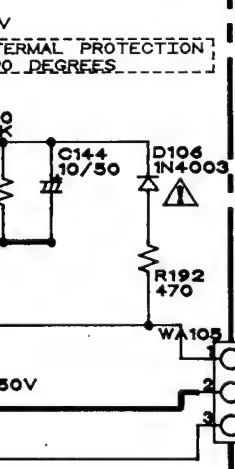
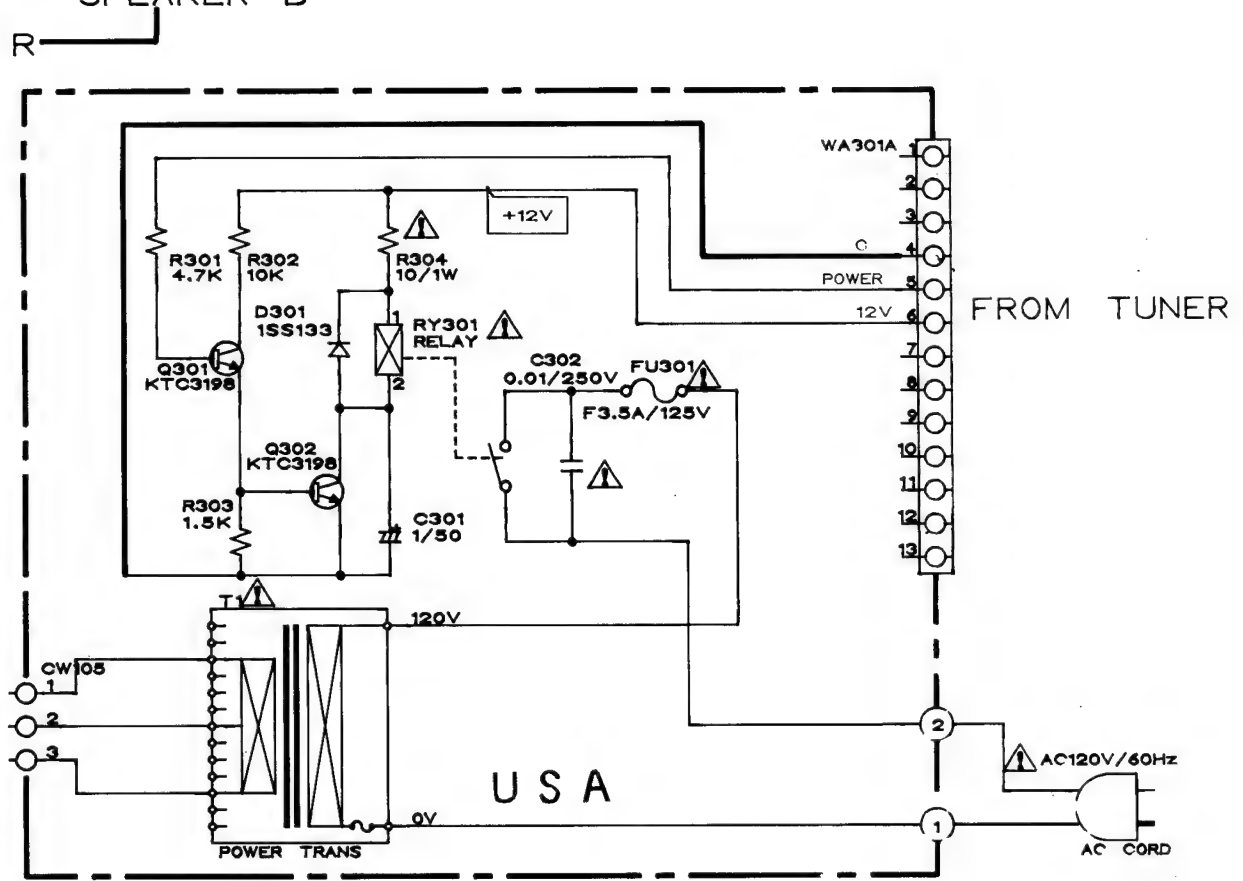
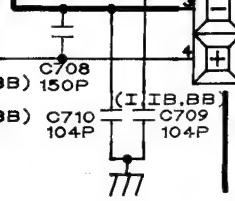
5
6
7
8
9
10

FEONZU BAL



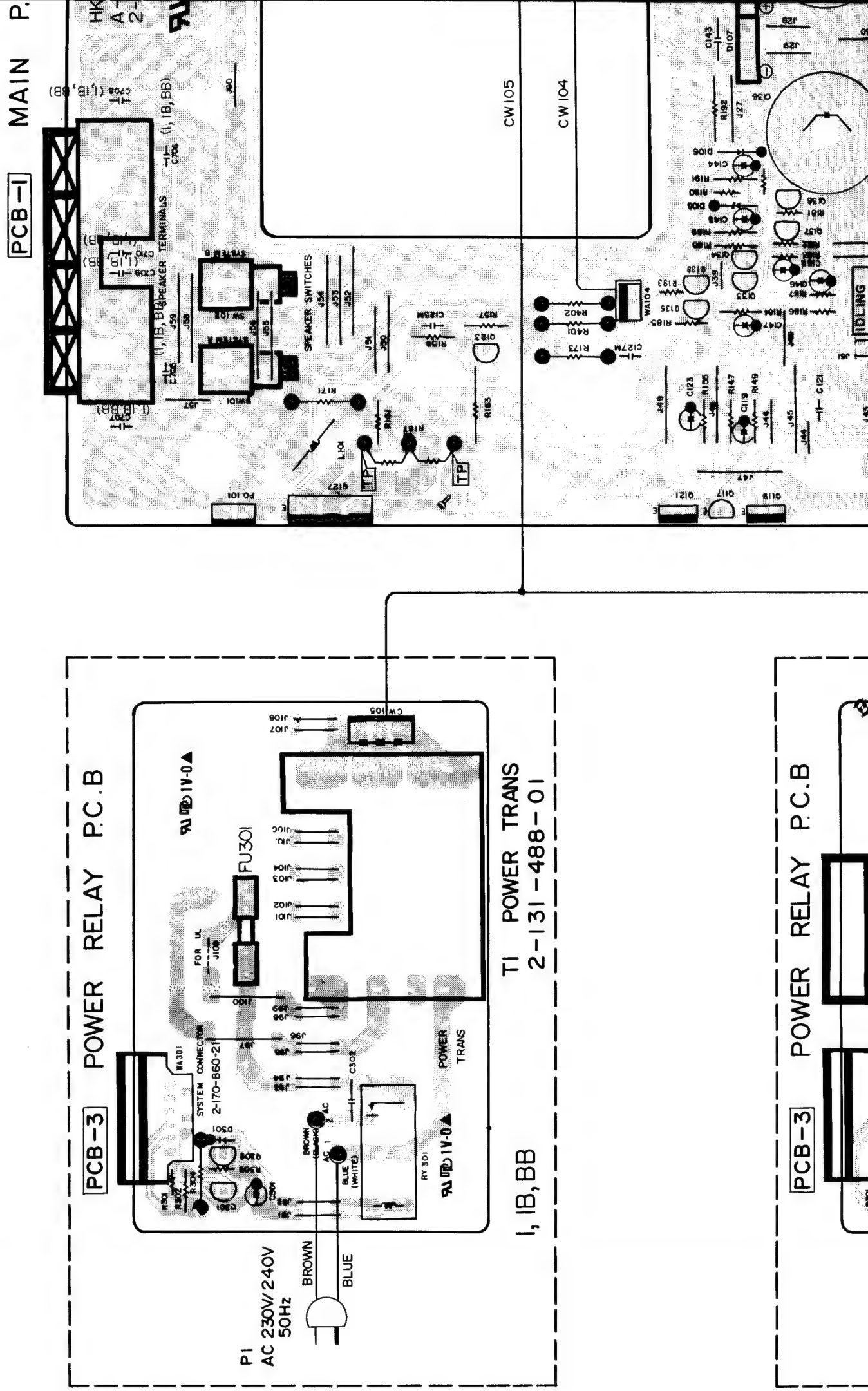




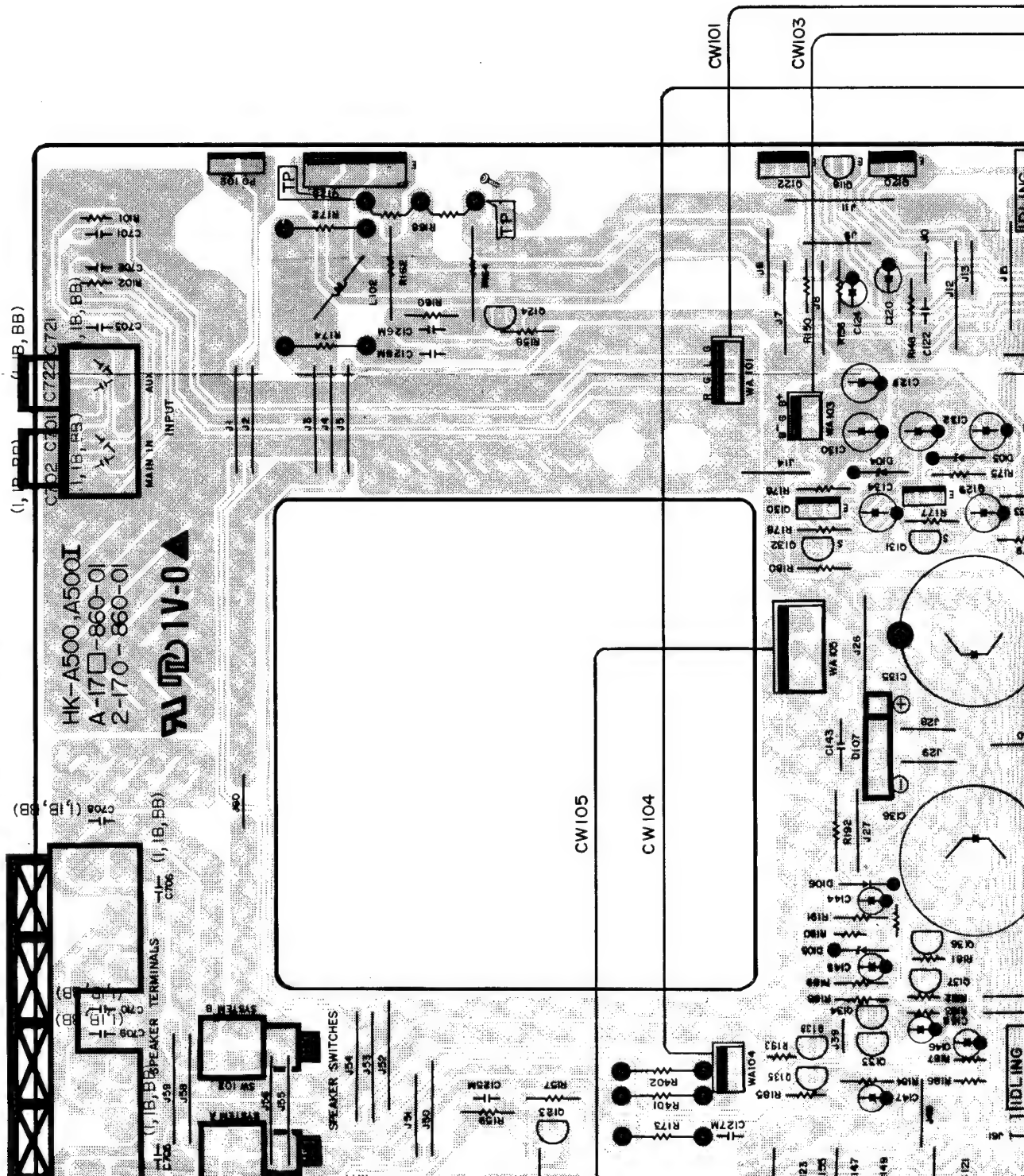


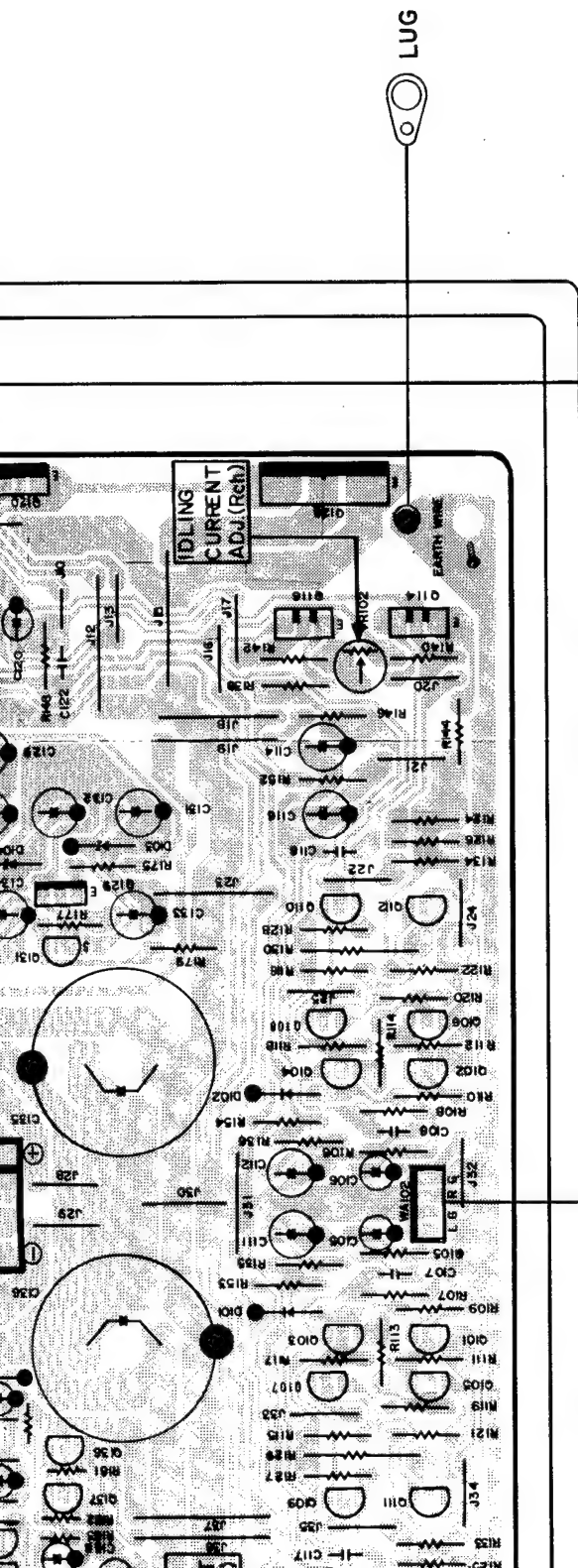
WIRING DIAGRAM

A-500



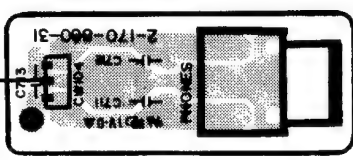
MAIN P.C.B



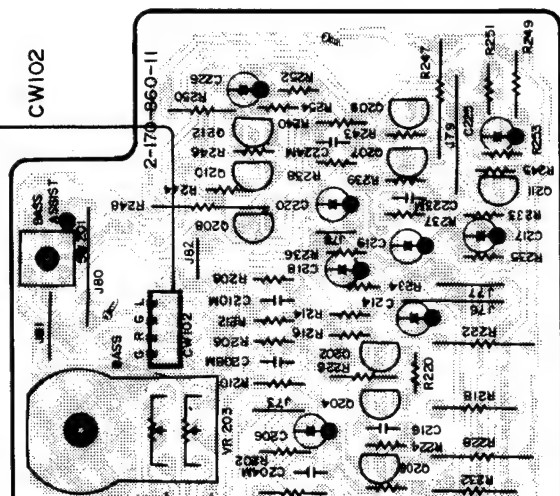


PCB-4

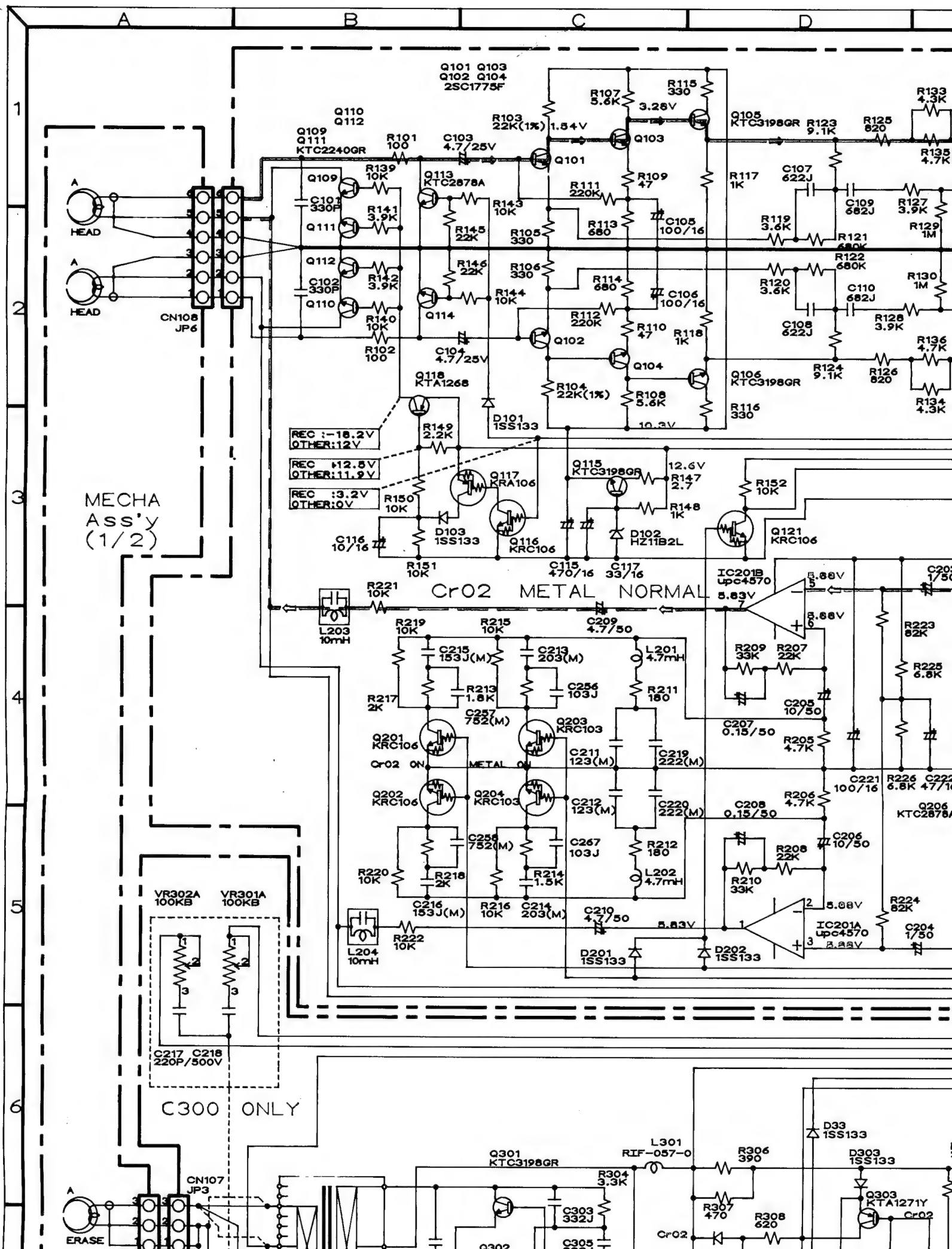
HEADPHONES
P. C. B

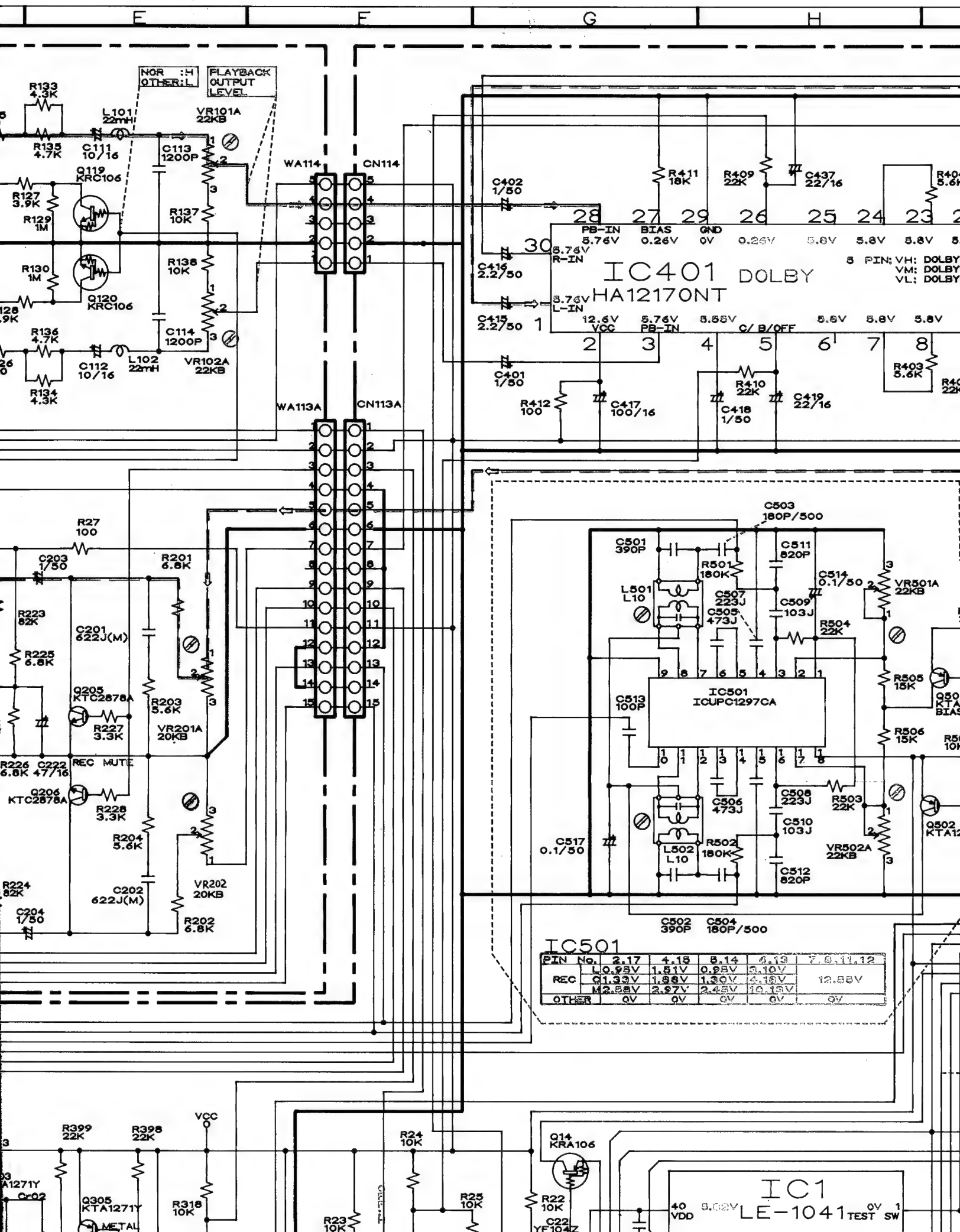


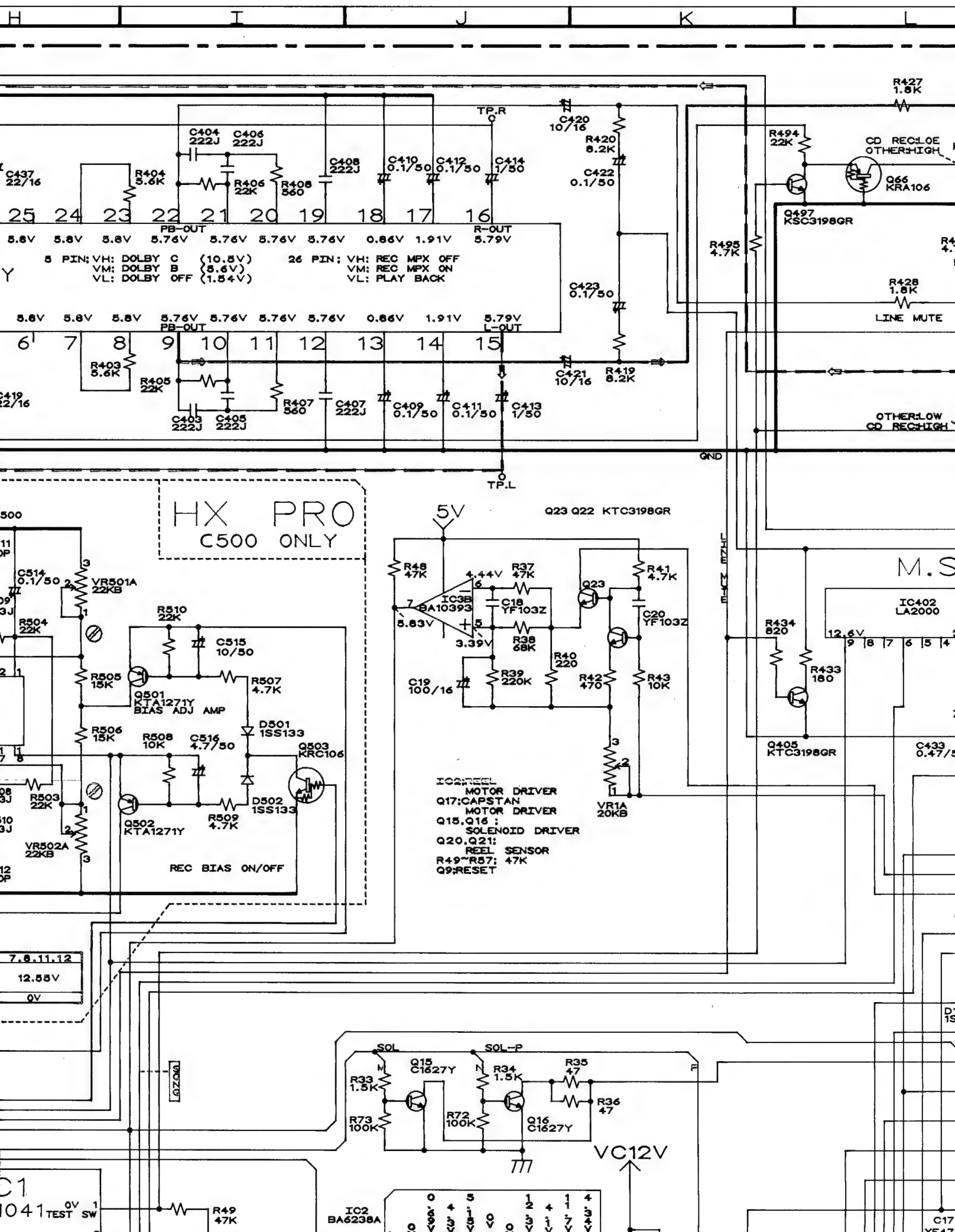
ROL P.C.B

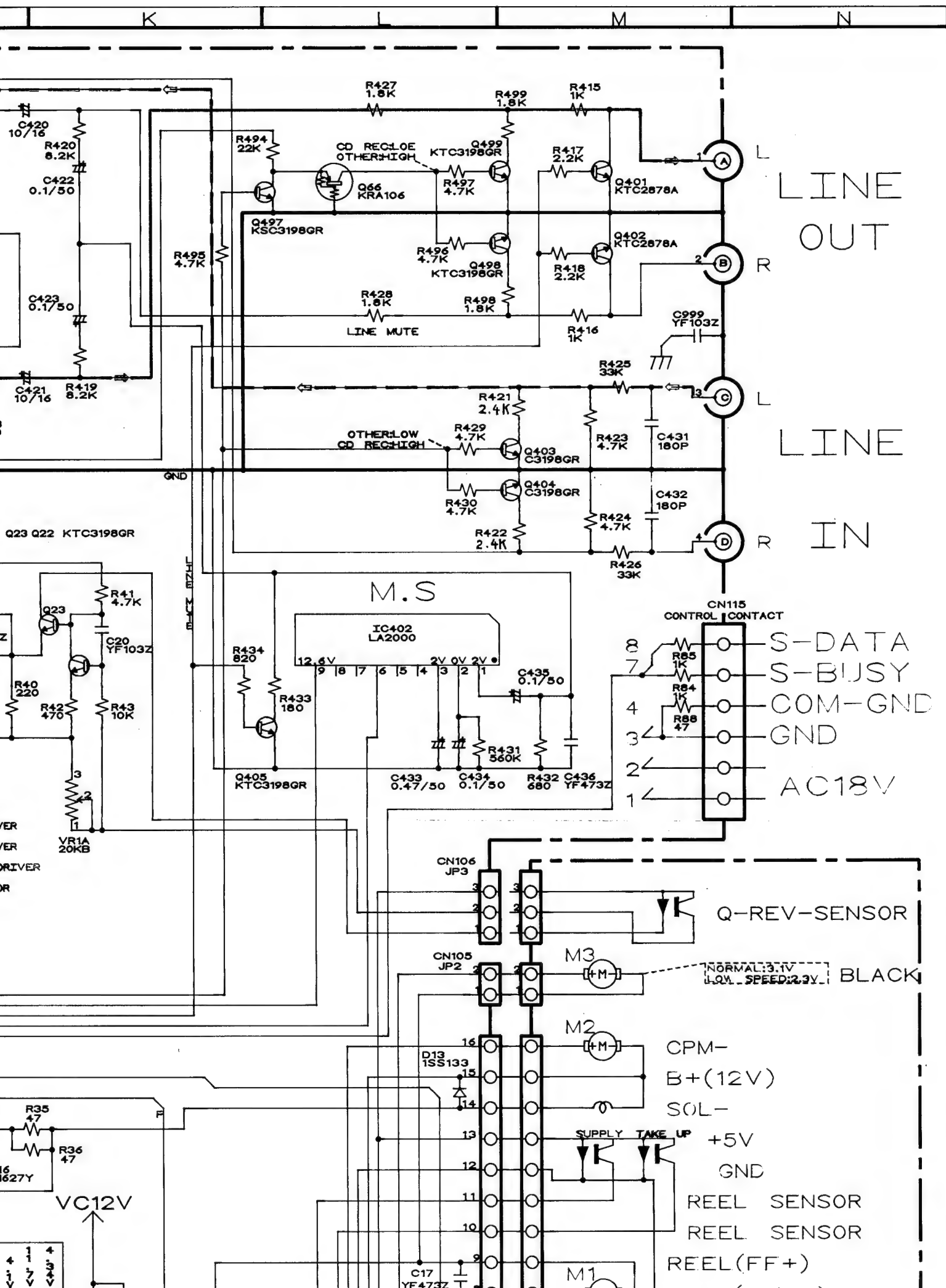


SCHEMATIC DIAGRAM (C300/C500)

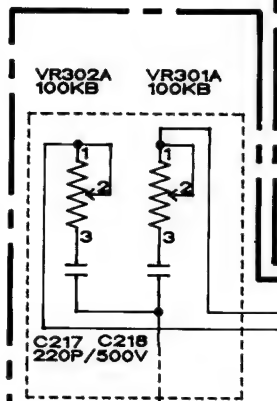
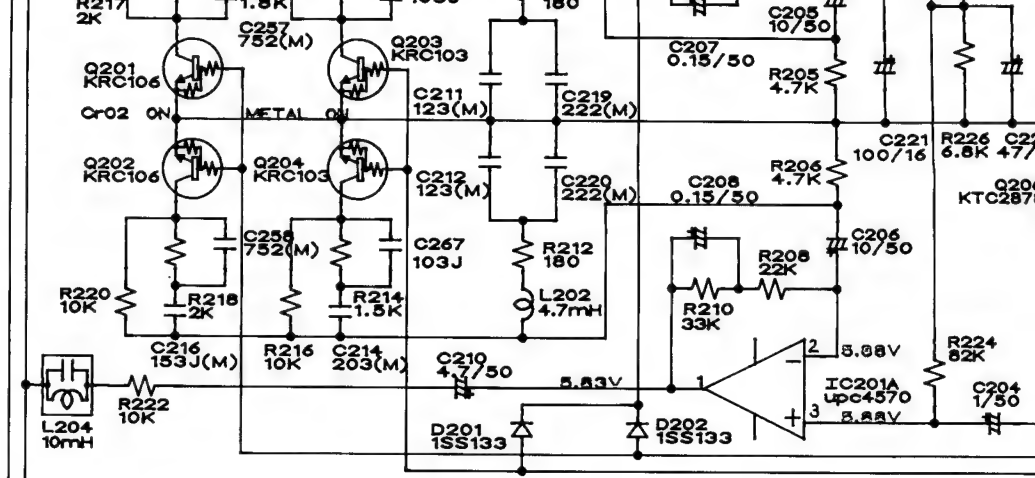




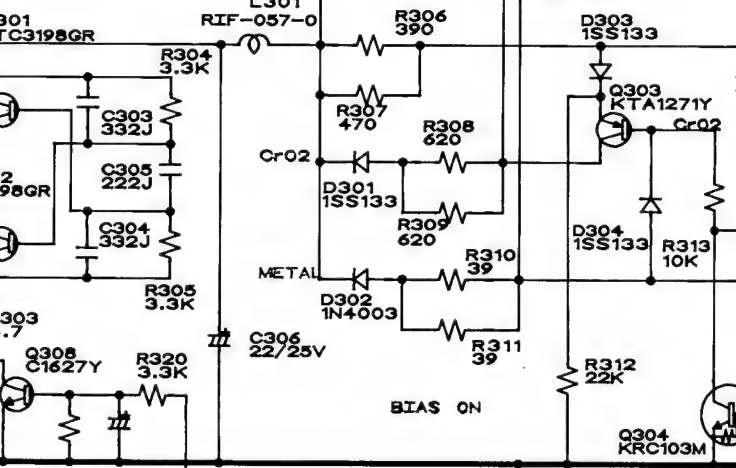
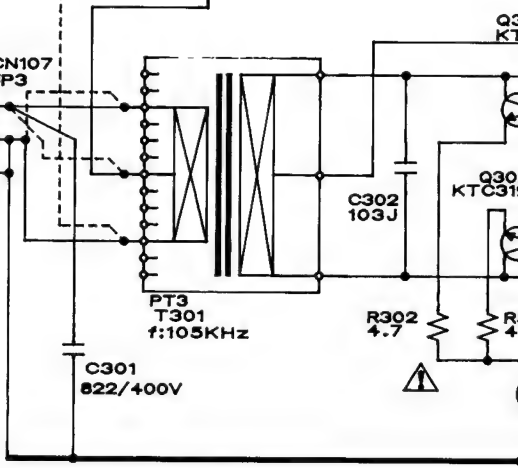
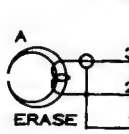




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6
7
8
9
10



C300 ONLY



HK-C500
T301:2-129-352-01

HK-C300
T301:2-129-231-02

TO TUNER
AC INPUT

- NOTE -

1. RESISTOR

INDICATED IN OHM, 1/4W, 1/8, +/-5% TOLERANCE UNLESS OTHERWISE NOTED
K : KOHM M : MOHM

2. CAPACITOR

INDICATED IN CAPACITY (UF/VOLTAGE) UNLESS OTHERWISE NOTED P : pF
INDICATION WITHOUT VOLTAGE IS 50V EXCEPT ELECTROLYTIC CAPACITOR.

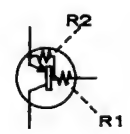
3. VOLTAGE

DC VOLTAGE AT NO INPUT SIGNAL

4. OTHERS

➡ ⇨ : SIGNAL ROUTE
⊗ : ADJUSTING POINT

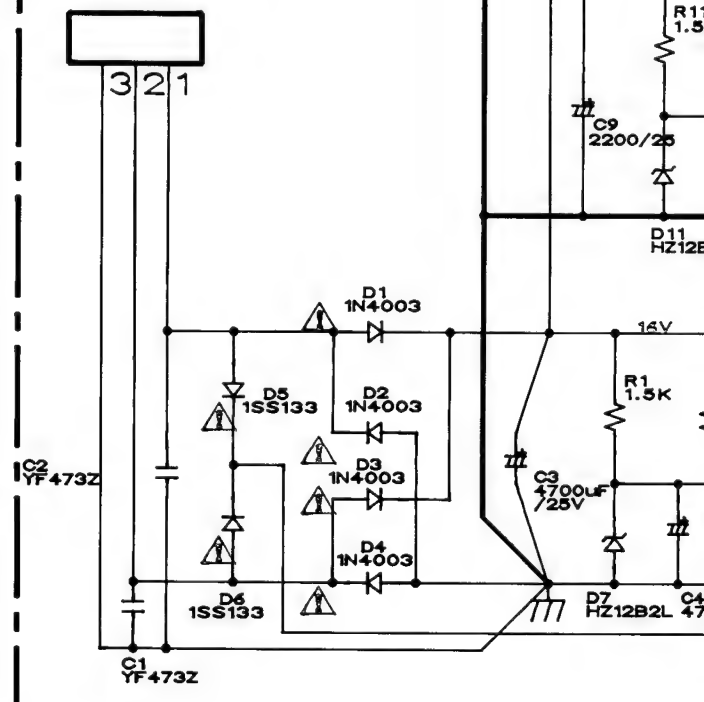
THE MARK FOUND ON SOME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THEREFORE, WHEN REPLACING, BE SURE TO USE PARTS OF IDENTICAL DESIGNATION.

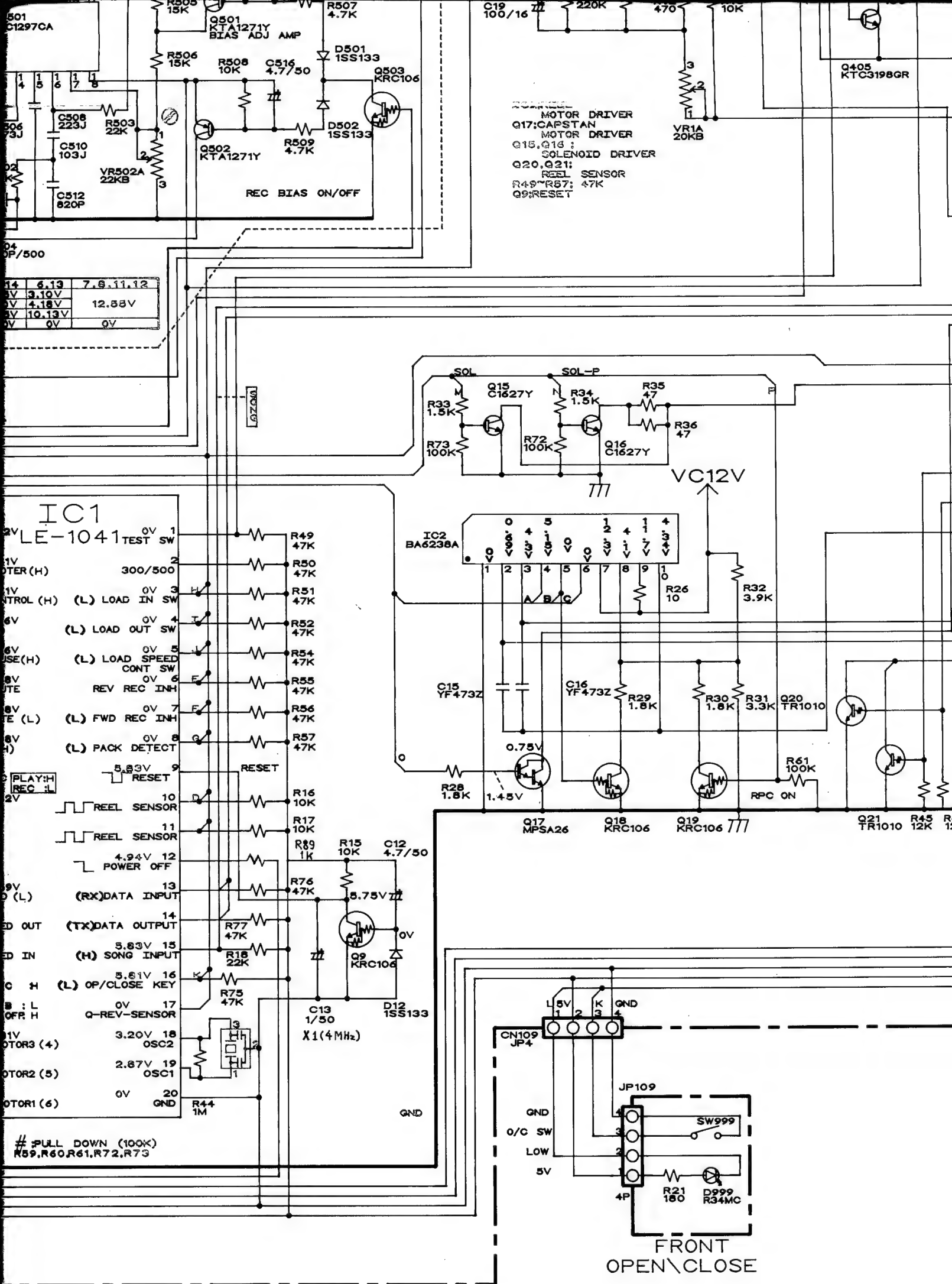


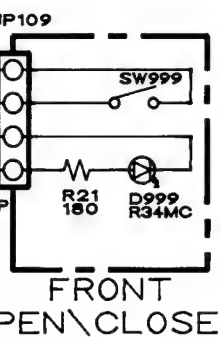
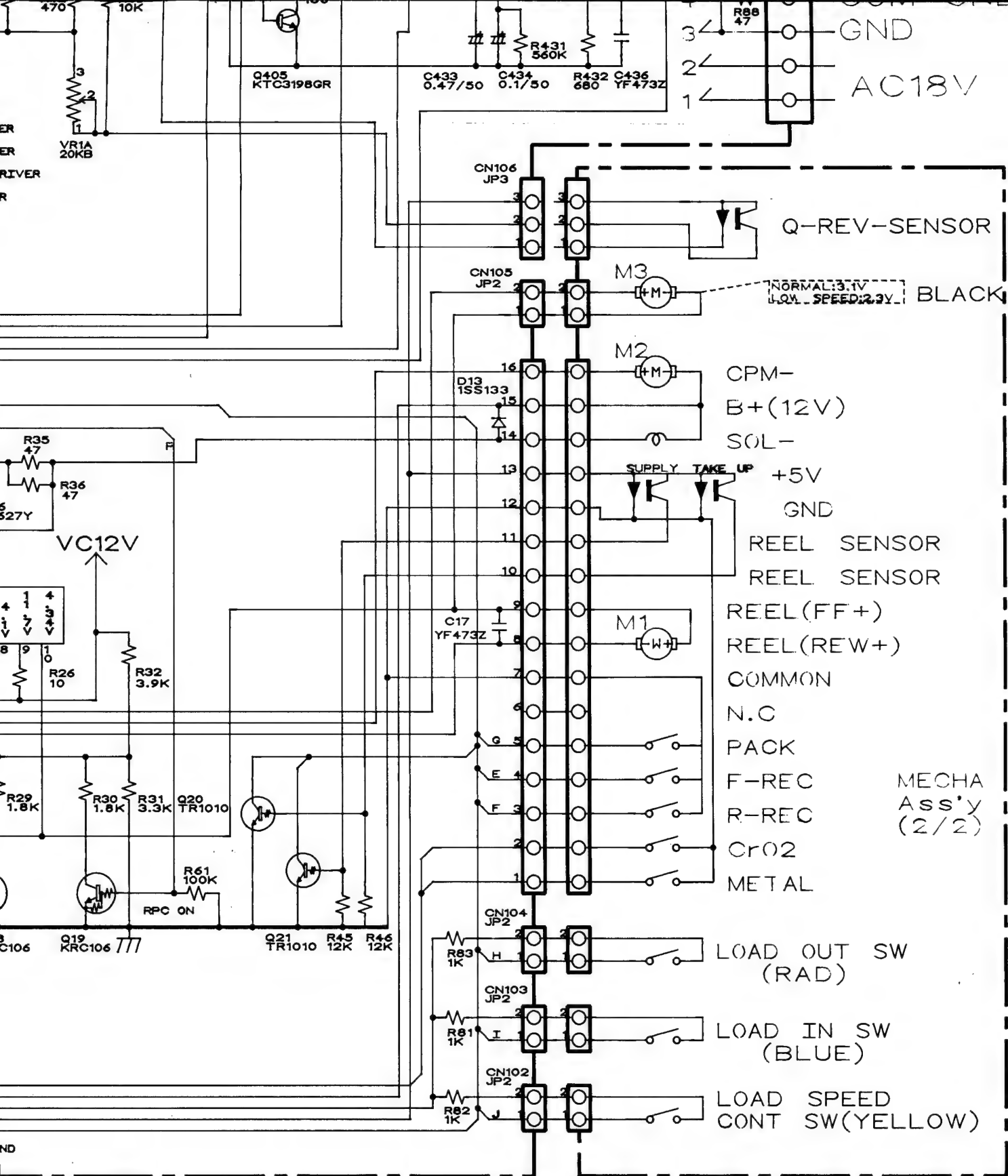
R1=4.7K
R2=47K
OR
R1/R2=22K/22K



R1=4.7K
R2=47K
OR
R1/R2=22K/22K





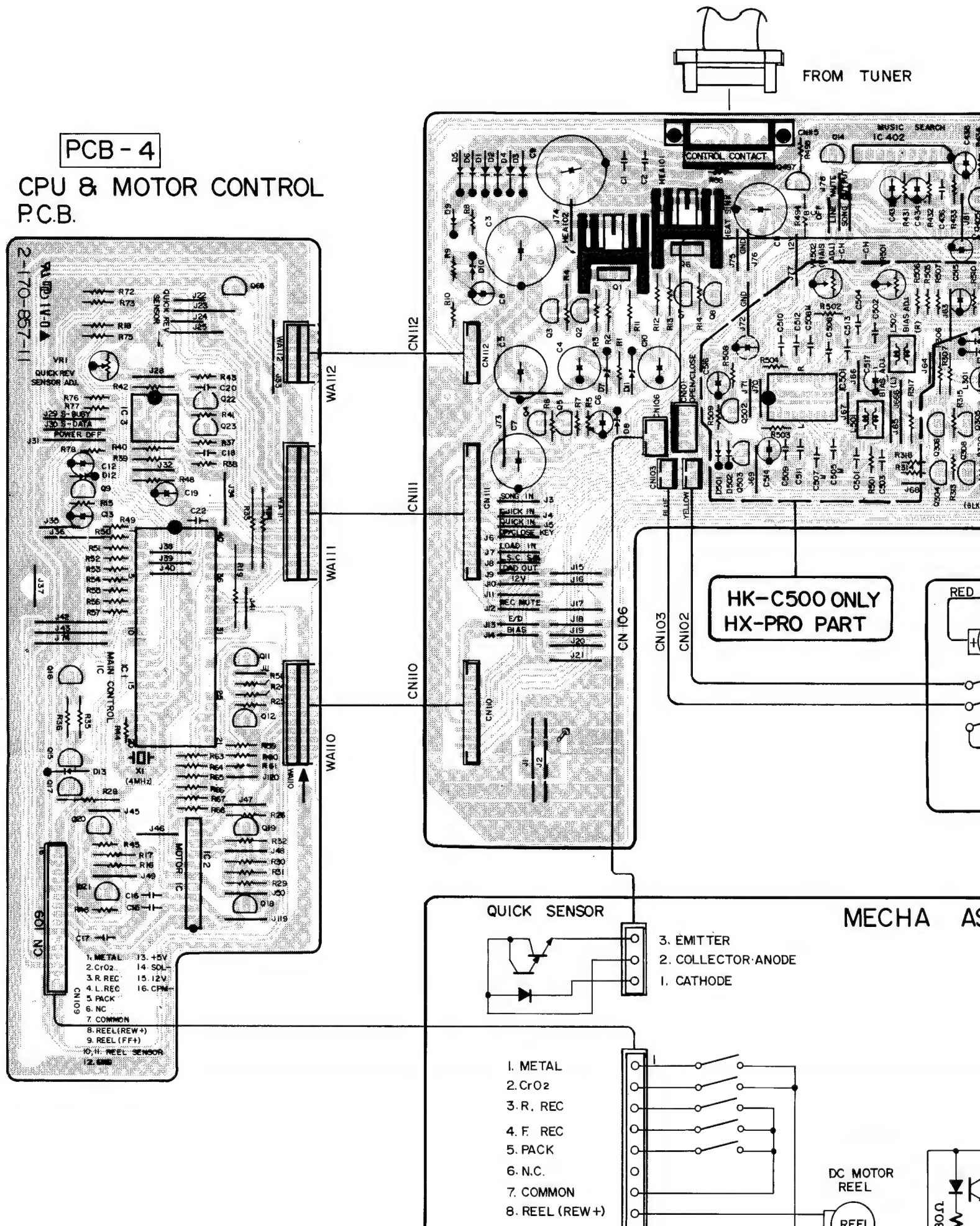


WIRING DIAGRAM

C300/500

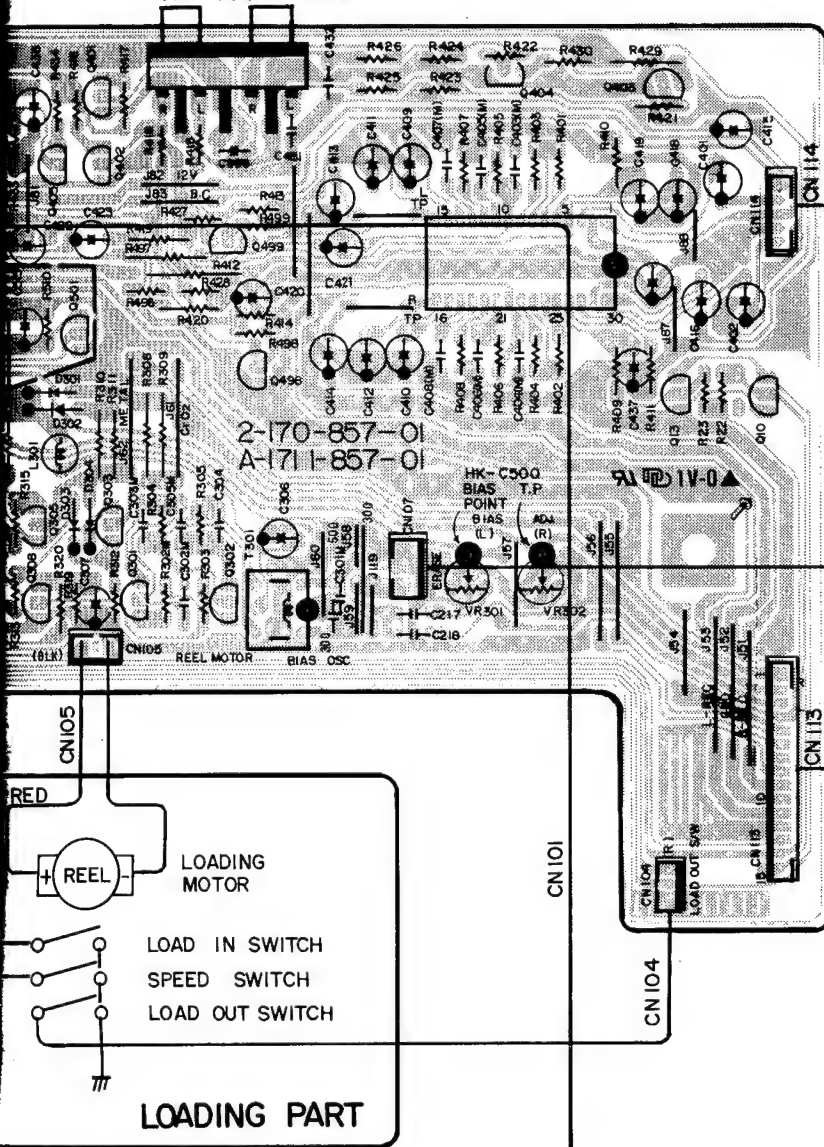
PCB - 4

CPU & MOTOR CONTROL
P.C.B.



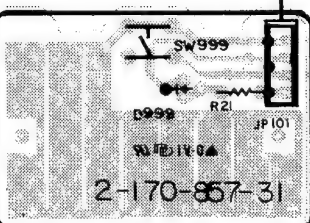
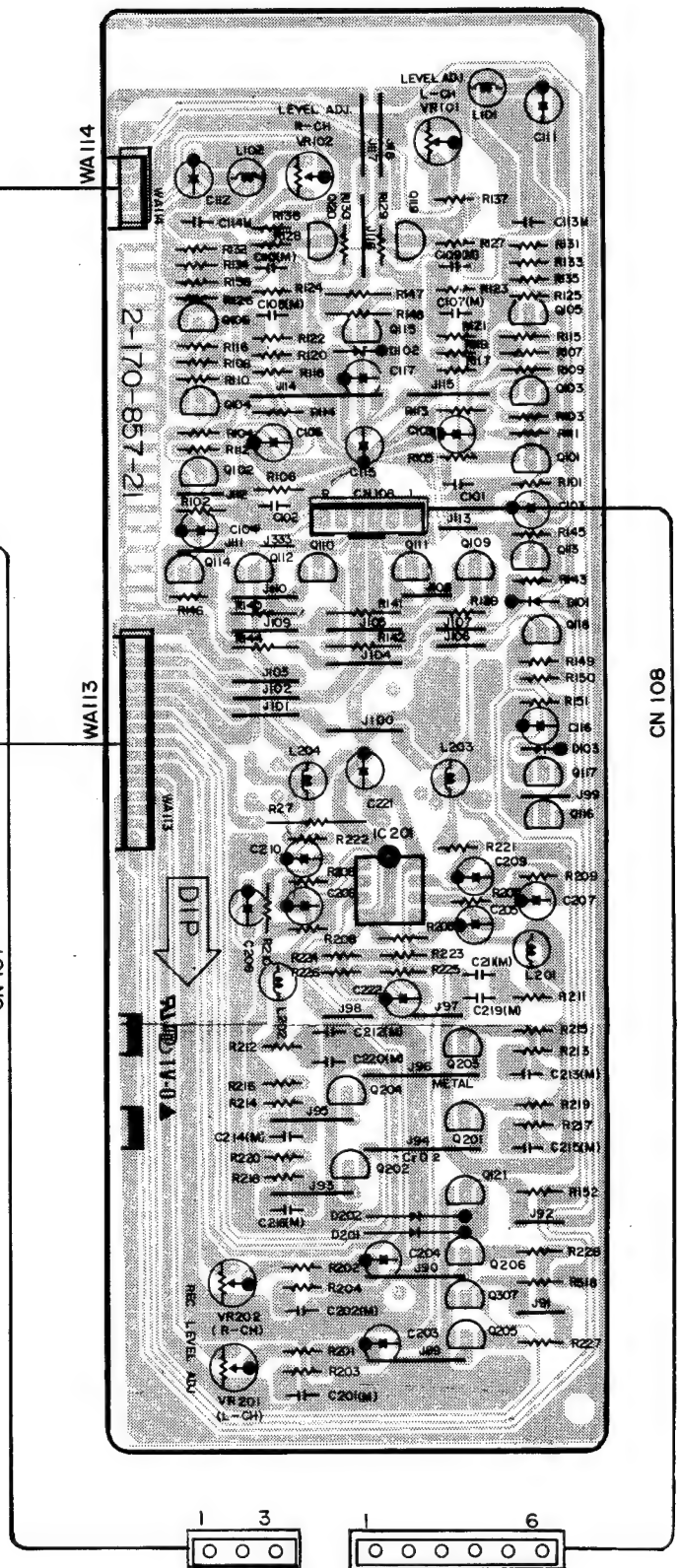
PCB-1

MAIN P.C.B.



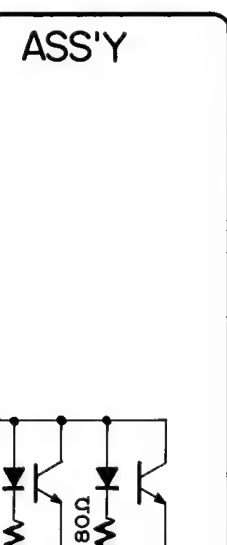
PCB-2

REC/PLAY P.C.B.



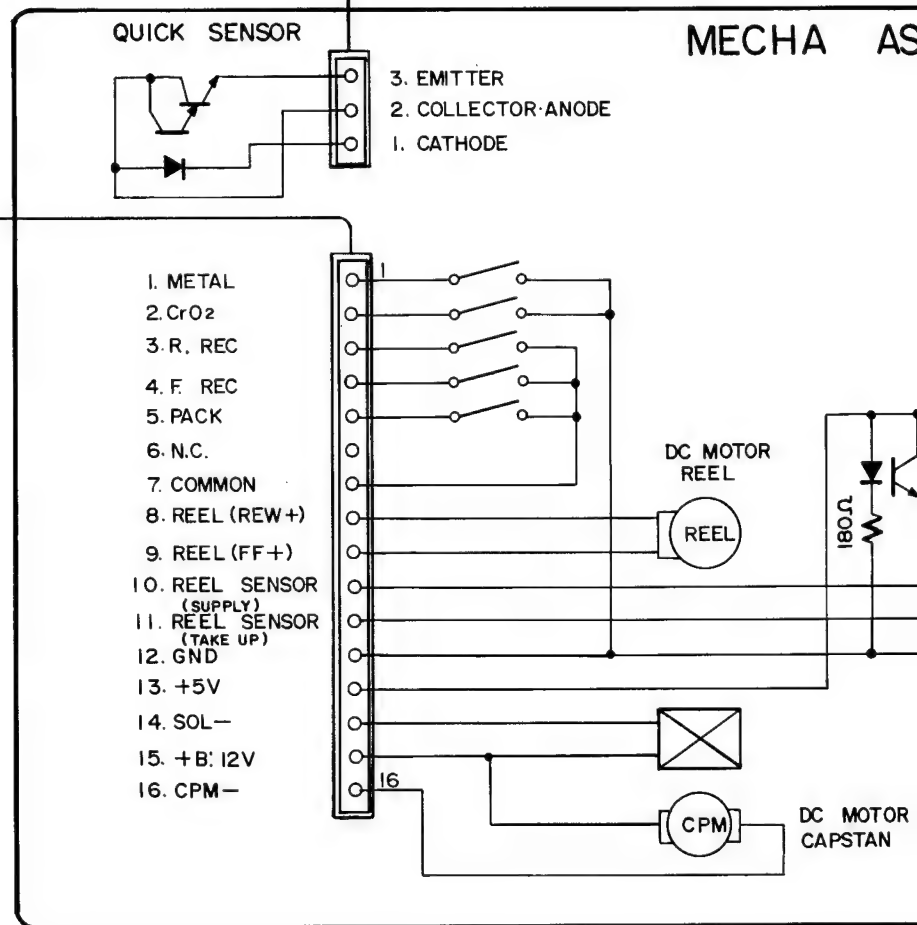
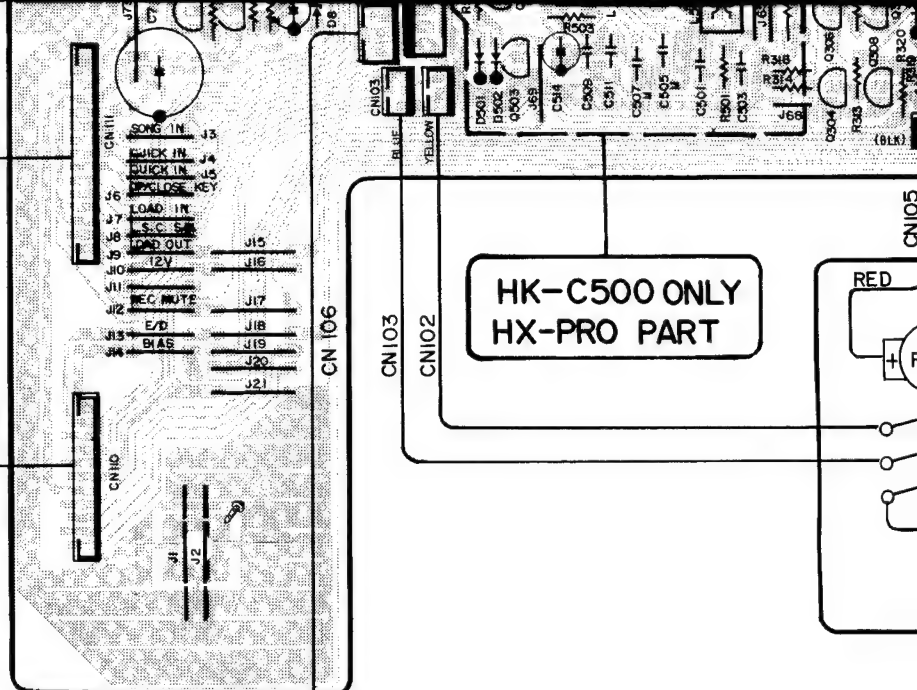
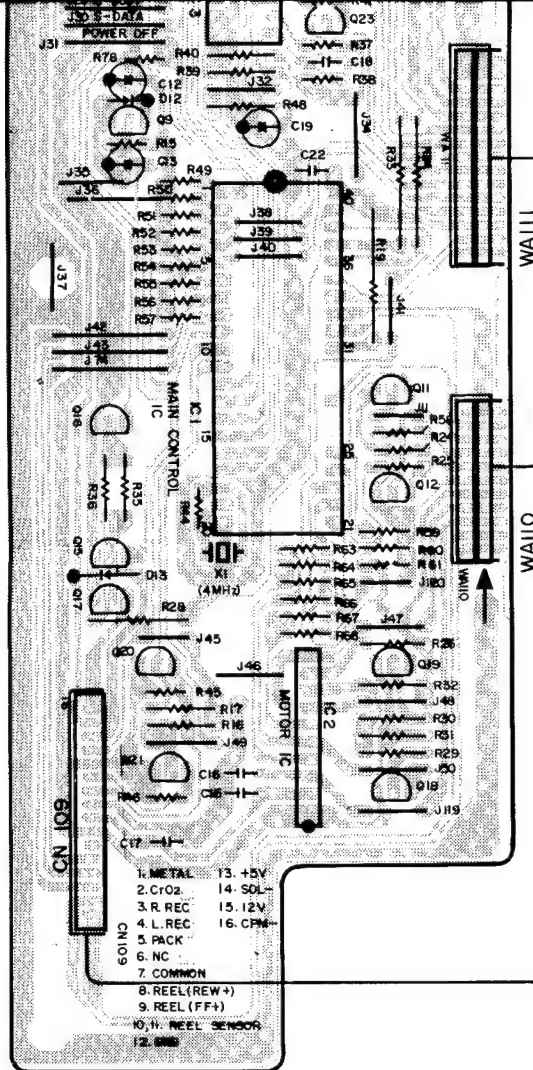
OPEN/CLOSE KEY P.C.B.

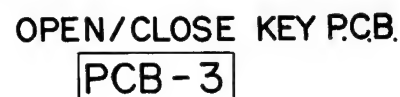
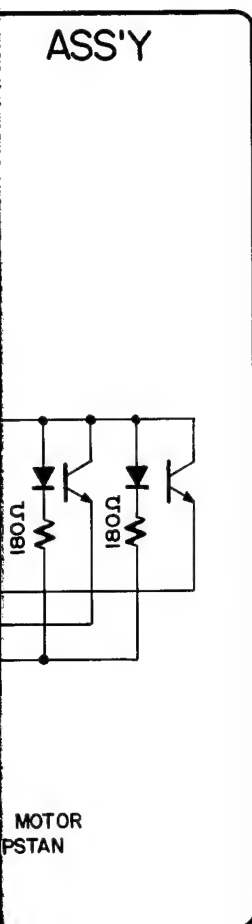
PCB-3



ERASE HD
1. YEL
2. WHT
3. SHIELD

R/P HD
1. ORG
2. BLU
3. SHIELD
4. SHIELD
5. BRN
6. RED





SCHEMATIC DIAGRAM (CD 300/CD500)

CD MECHA ASS'Y
KSL - 2102AAM
2-219-116-01

52.PICK-UP
ASS'Y
8-848-127-(31)

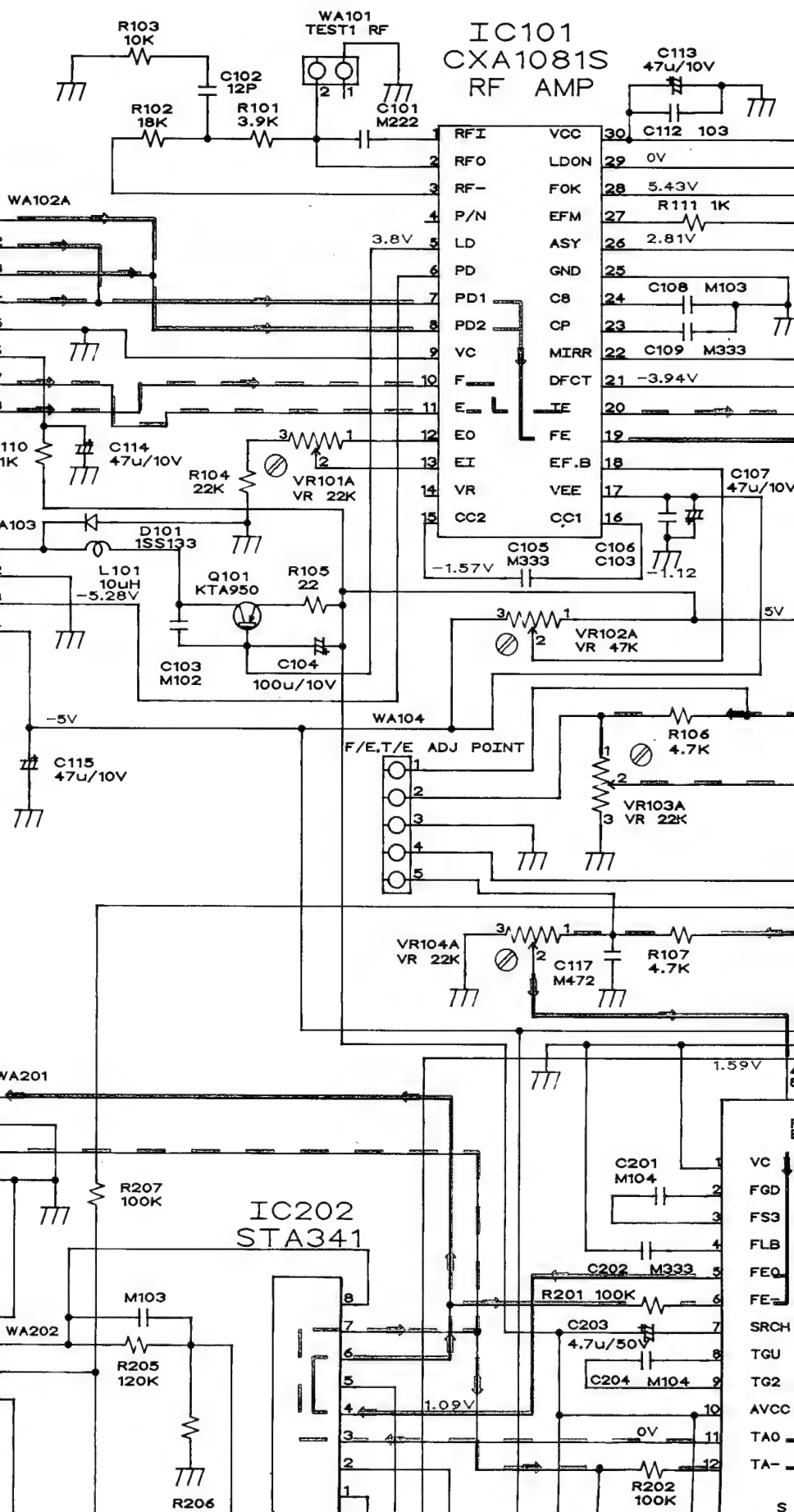
57.SLIDE MOTOR
X-2641-358-(1)

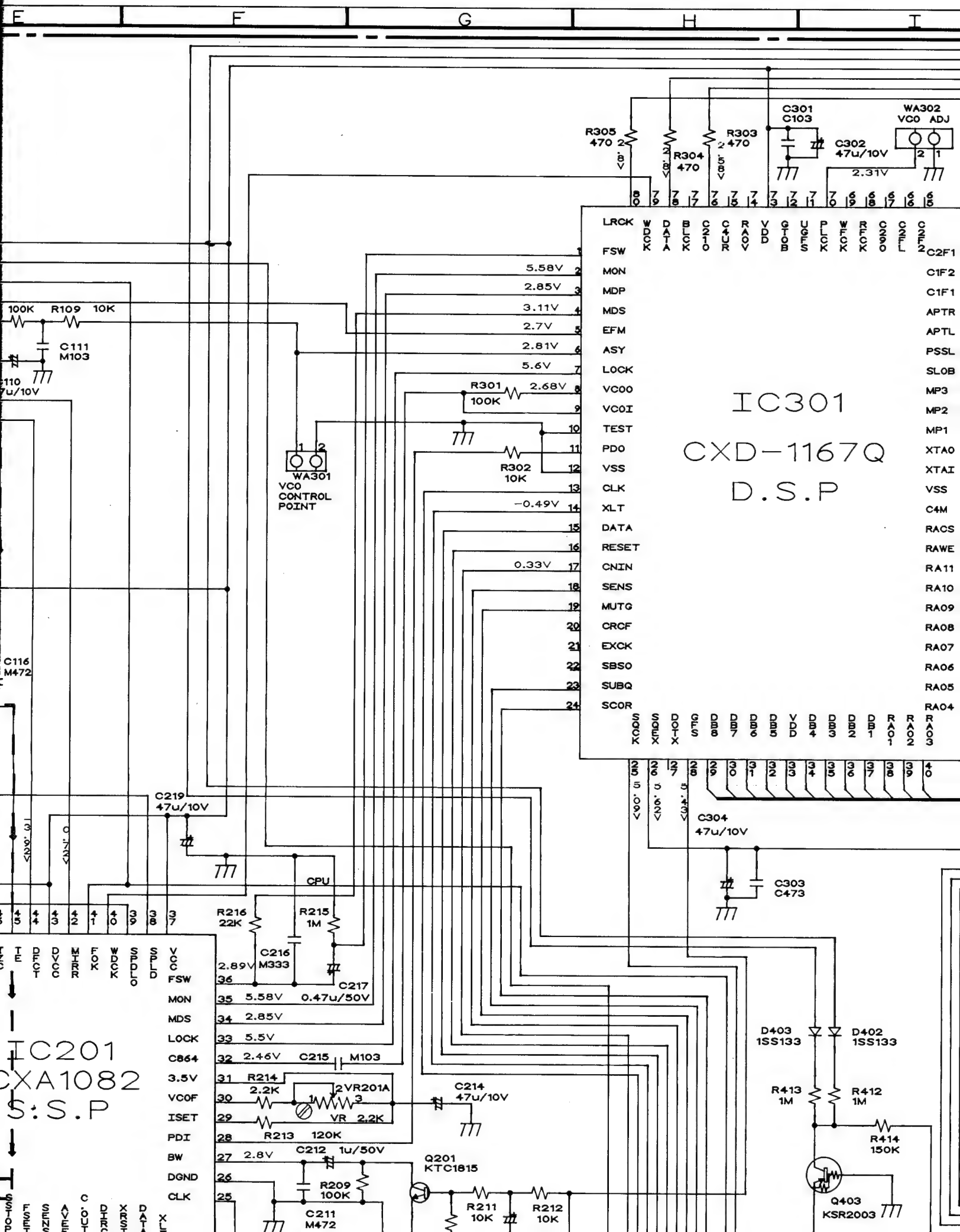
63.SPINDOL MOTOR
X-2641-356-(1)

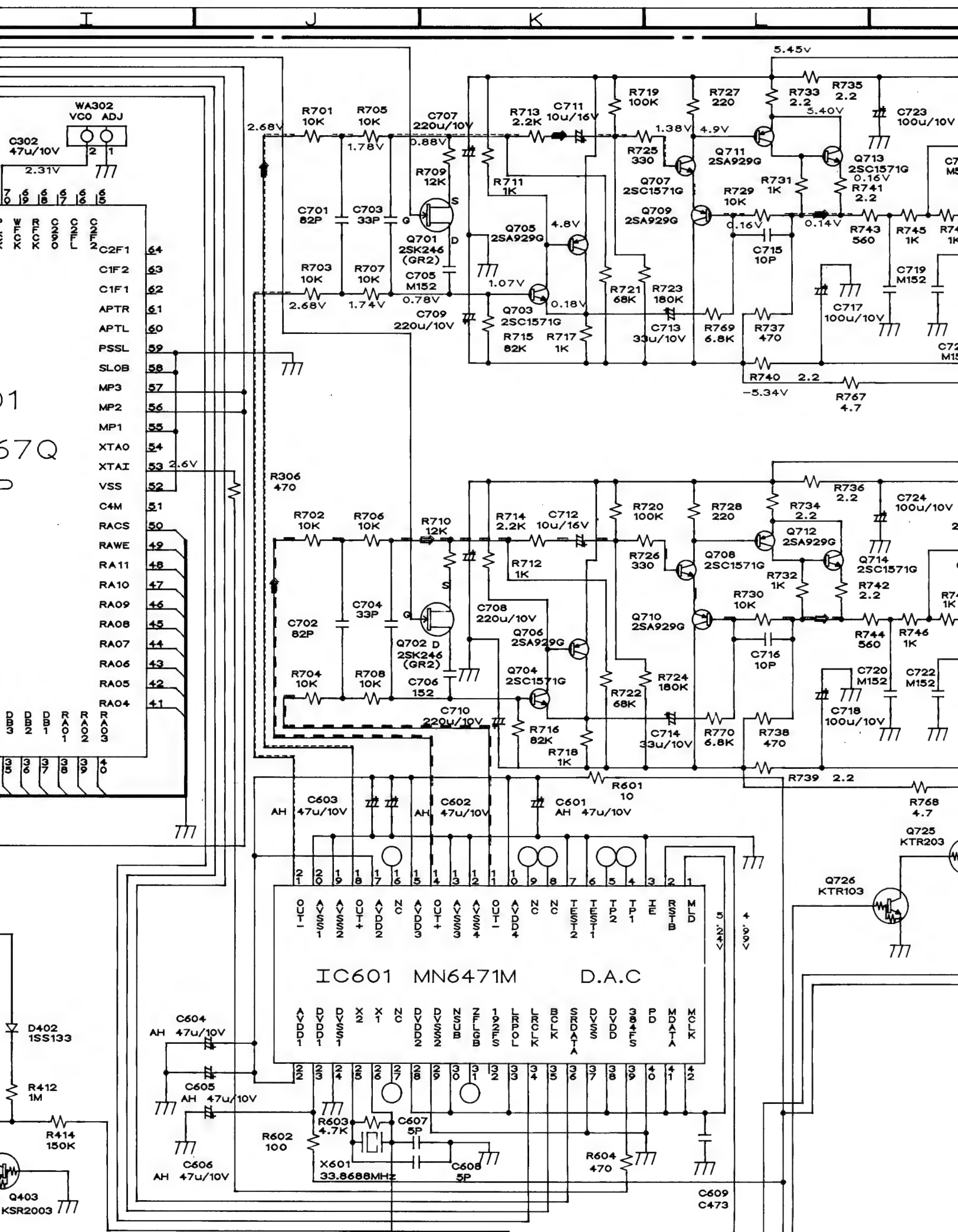
64.LIMIT SW
1-570-053-(12)

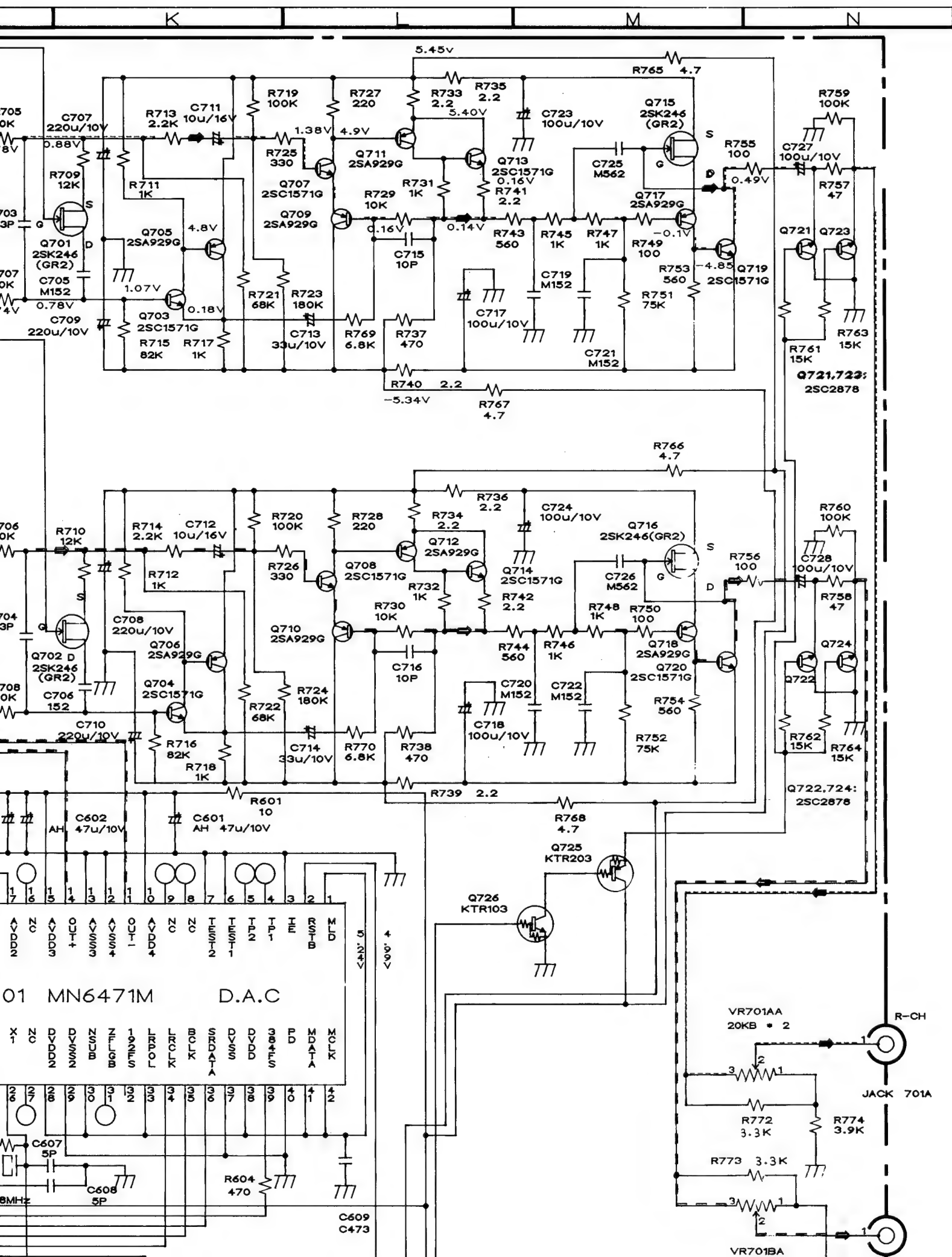
FOCUS COIL

TRACKING COIL



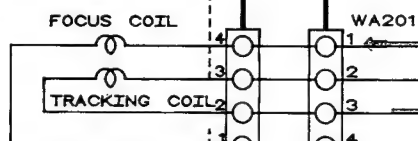
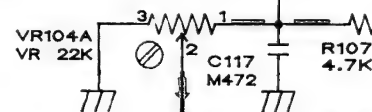
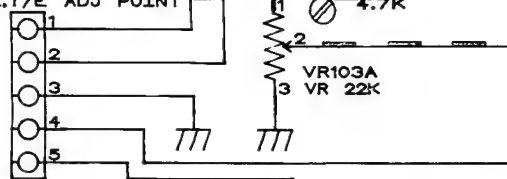






8-848-127-(31)

C115
47u/10V



57.SLIDE MOTOR
X-2641-358-(1)

63.SPINDOL MOTOR
X-2641-356-(1)

64.LIMIT SW
1-570-053-(12)

23.OP/CL LIMIT SW
1-572-052-(1)

29.LOADING MOTOR
X-2641-336-(1)

IC202
STA341

Q203
MPSA26

Q202
KTA950

R411
1K

Q401
KTA950

Q402
KTC2120

IC402
KA4558C

NOTE

1. RESISTOR

INDICATED IN OHM,1/2W,1/8W,+/-5%
TOLERANCE UNLESS OTHERWISE NOTED
K : K OHM, M : M OHM

2. CAPACITOR

INDICATED IN CAPACITY (uF/VOLTAGE)
UNLESS OTHERWISE NOTED P : pF
EXCEP ELECTROLYTIC CAPACITOR

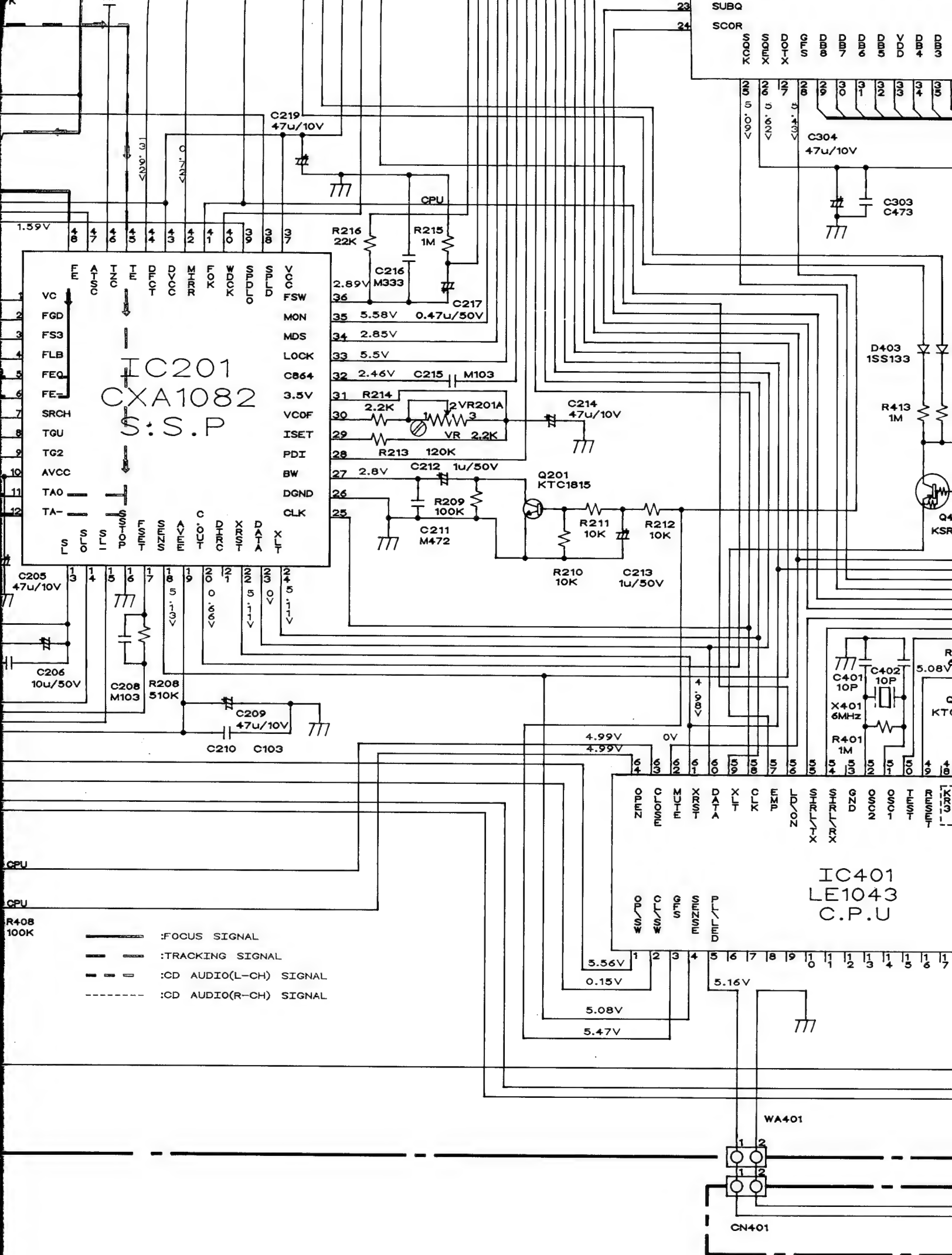
3. VOLTAGE

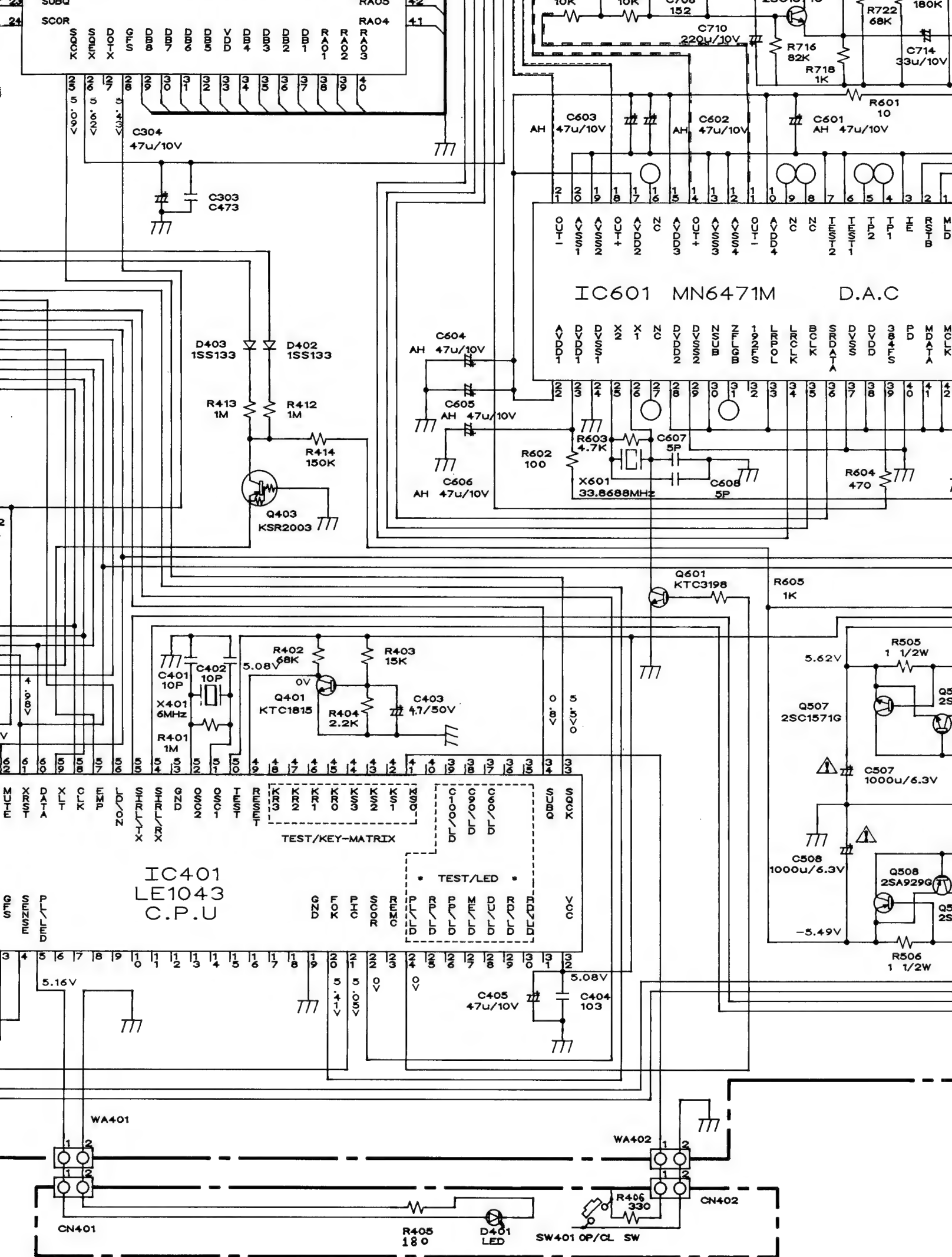
DC VOLTAGE AT NO INPUT SIGNAL

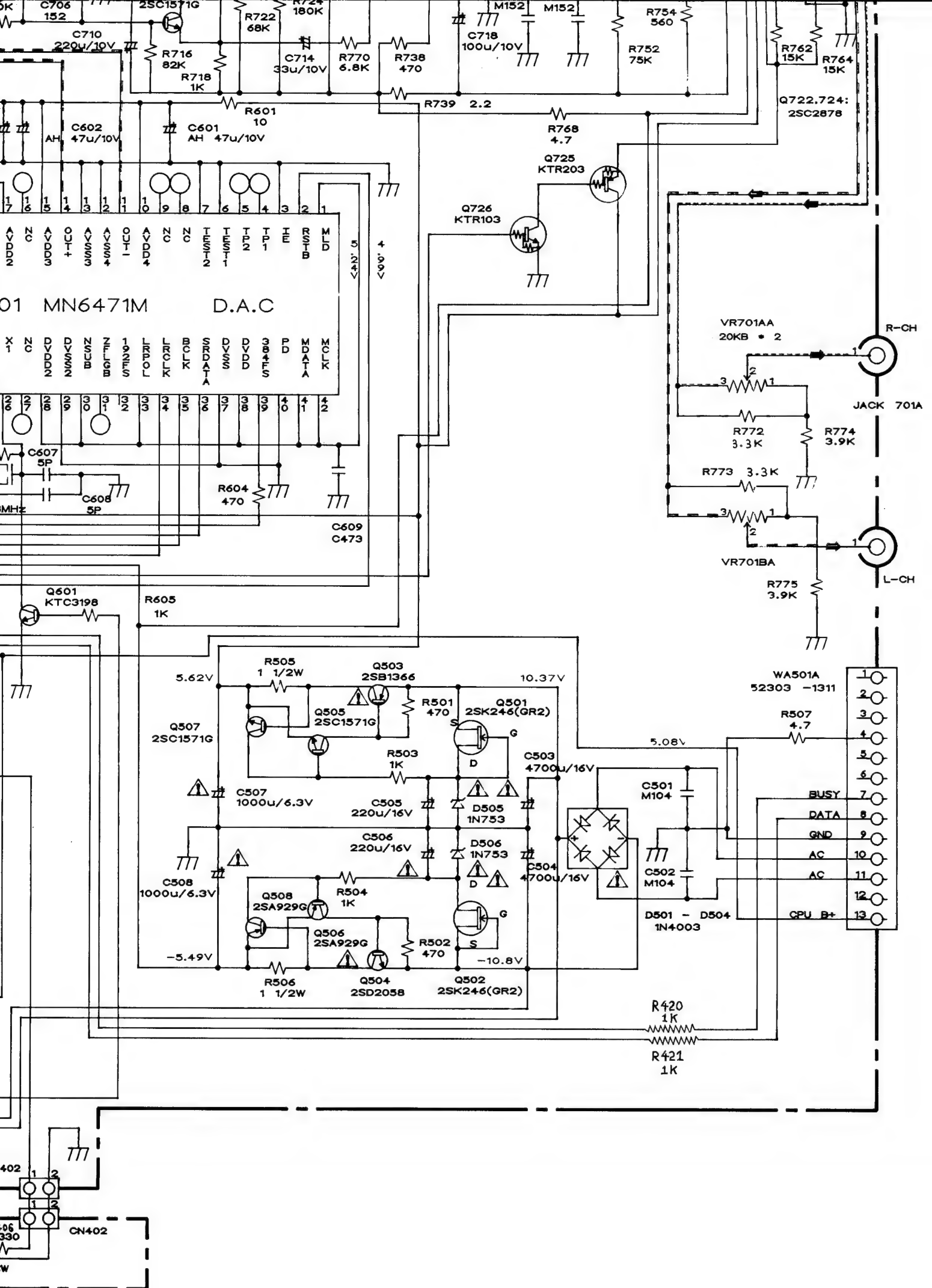
4. OTHERS

- ➡ : SIGNAL ROUTE
- ⊗ : ADJUSTING POINT

- 5. THE MARK FOUND ON SAME COMPONENT PARTS INDICATES THE IMPORTANCE OF THE SAFETY FACTOR OF THE PART. THE REFER.WHEN REPLACING,BE SURE TOUSE PARTS OF INDENTICAL DESIGNATION.







WIRING DIAGRAM

CD 300/500

CN 103 - 2

CN 102

CN 103 - 1

YEL

PUP

CN403

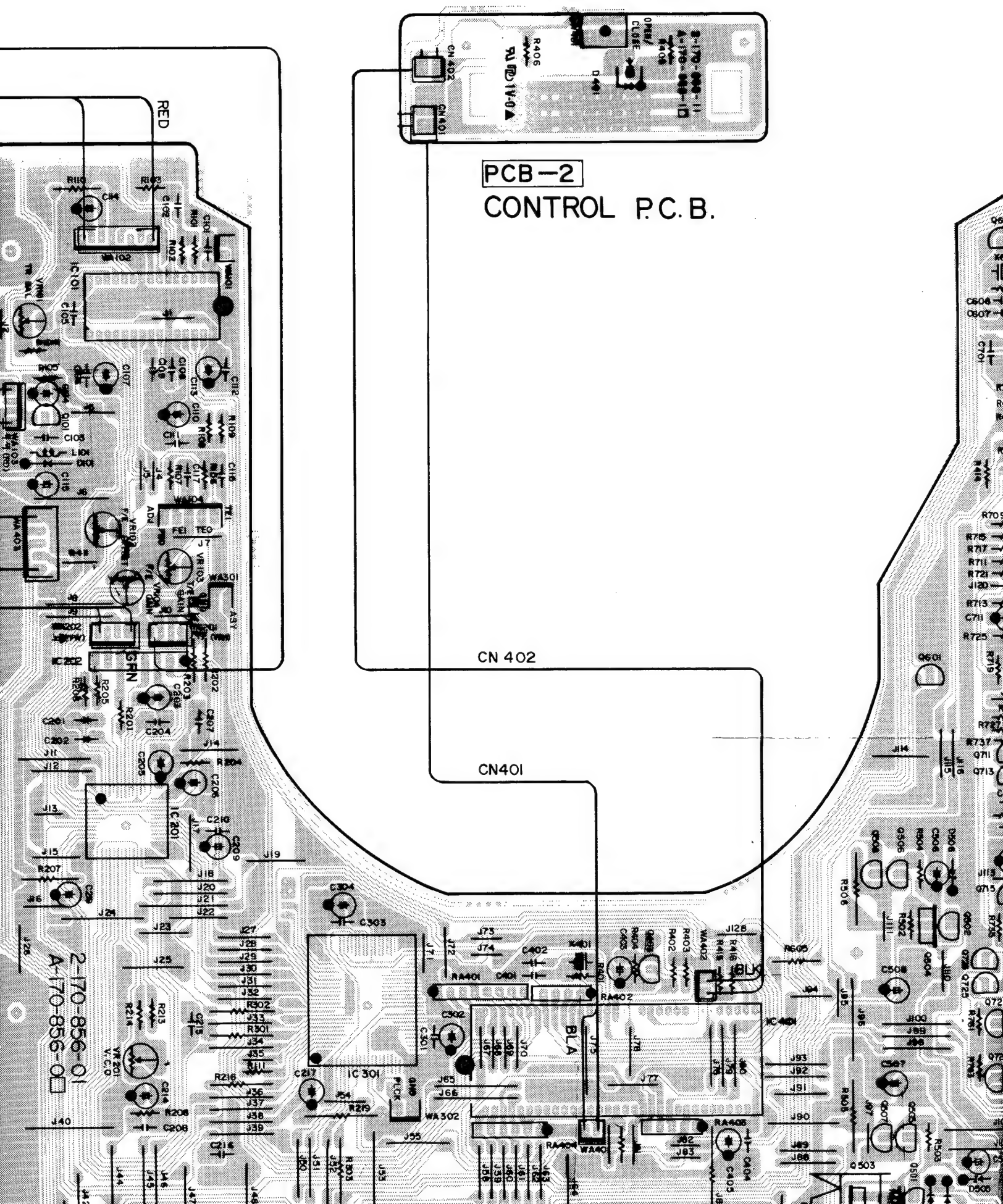
CN 202

CD MECHANISM

WHITE

RED

2-170-856-01
A-170-856-01



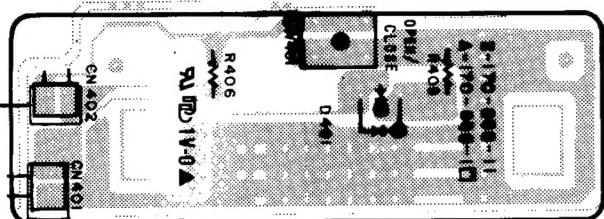
PCB-2

CONTROL P.C.B.

CN 402

CN401

2-170-856-01
A-170-856-01

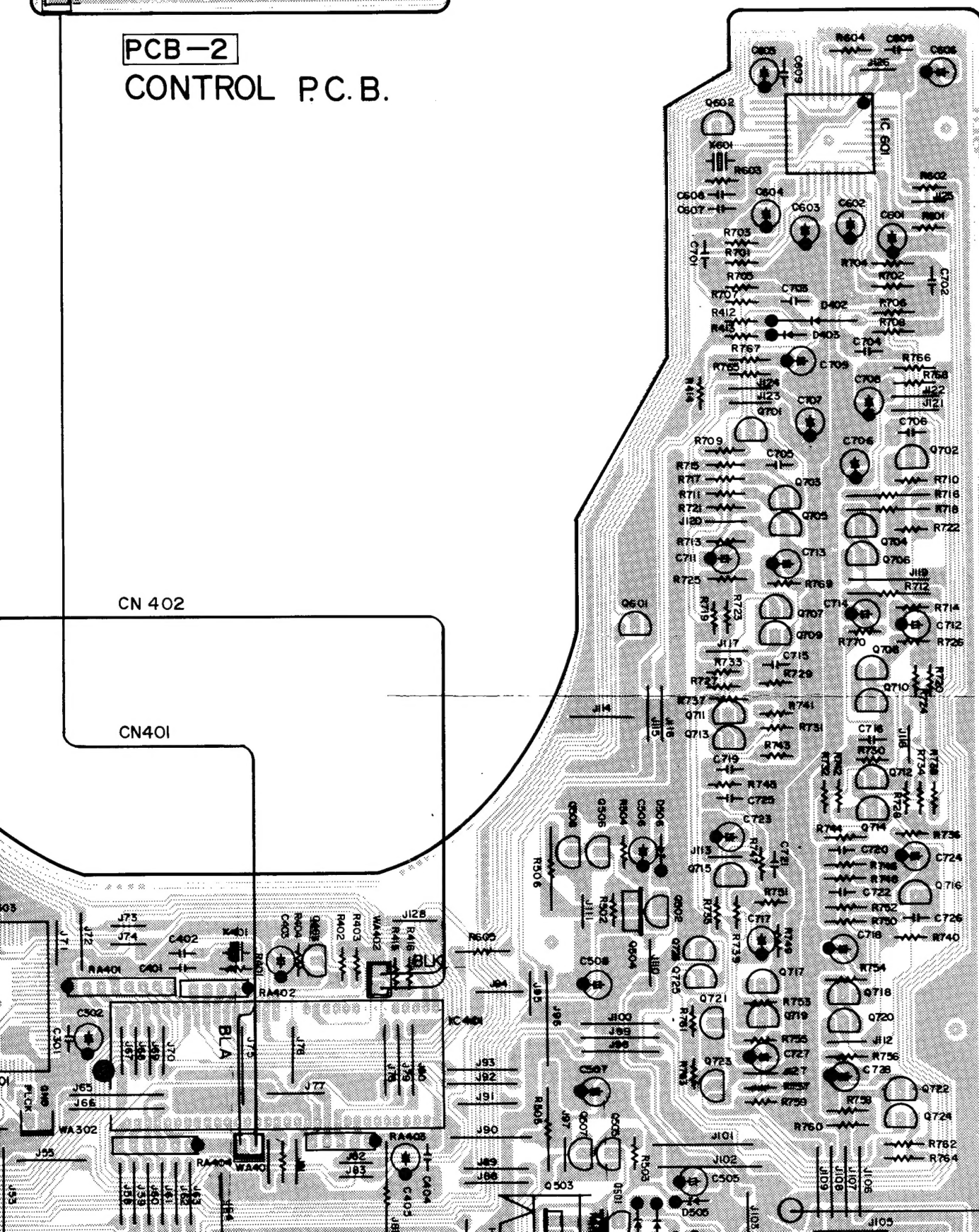


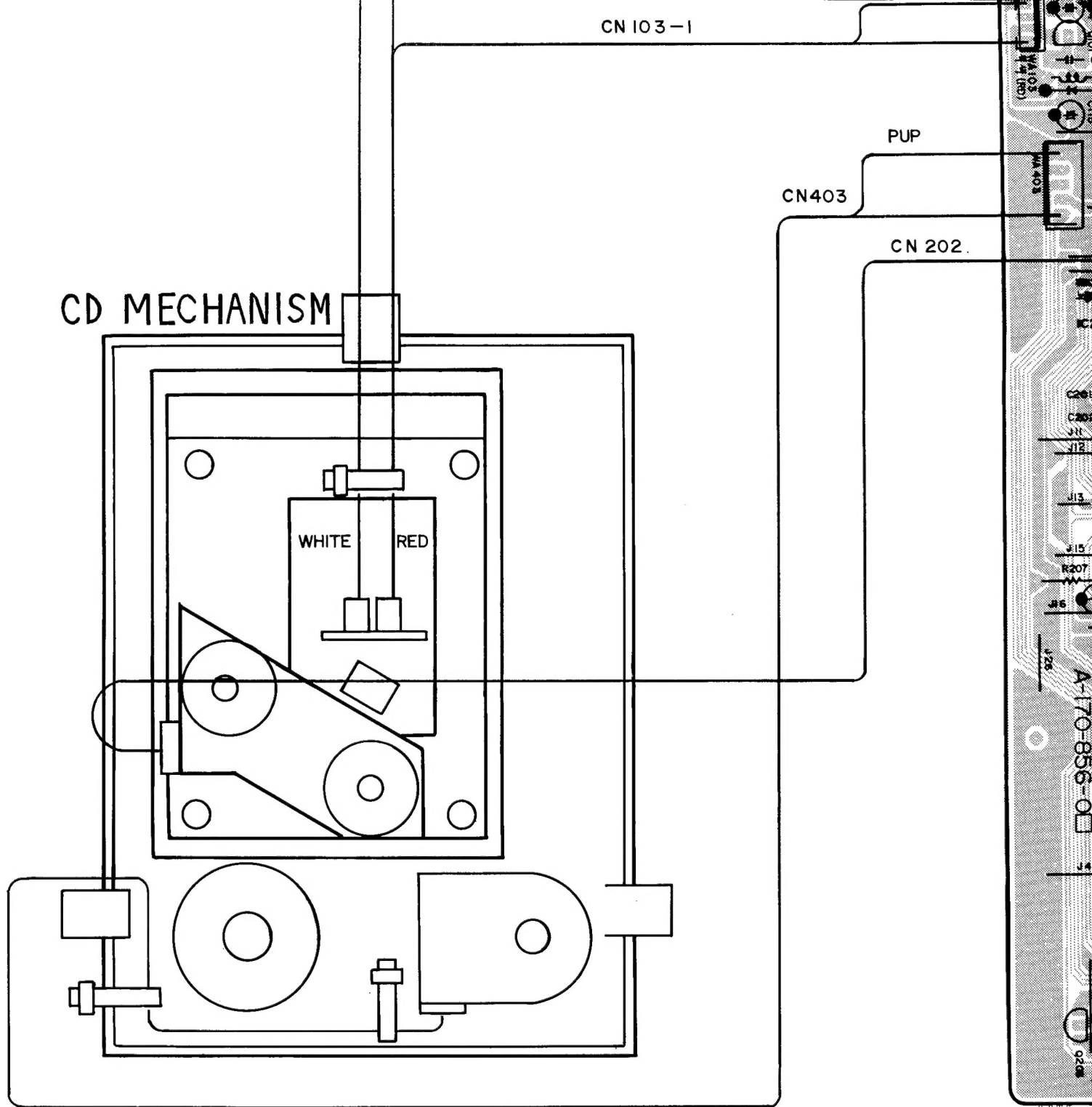
PCB-2

CONTROL P.C.B.

CN 402

CN401





WIRE COLOR ABBREVIATIONS

YEL : YELLOW
 BLK : BLACK
 GRN : GREEN

PUP : PURPLE
 RED : RED



